

# Eastern Pacific Expeditions of the New York Zoological Society. XLV. Non-intertidal Brachygnathous Crabs from the West Coast of Tropical America. Part 2: Brachygnatha Brachyrhyncha<sup>1,2</sup>

JOHN S. GARTH

Allan Hancock Foundation,  
University of Southern California

(Plate I; Text-figures 1 & 2)

[This is the forty-fifth of a series of papers dealing with the collections of the Eastern Pacific Expeditions of the New York Zoological Society made under the direction of William Beebe. The present paper is concerned with specimens taken on the Templeton Crocker Expedition (1936) and the Eastern Pacific "Zaca" Expedition (1937-1938). For data on localities, dates, dredges, etc., refer to *Zoologica*, Vol. XXII, No. 2, pp. 33-46, and Vol. XXIII, No. 14, pp. 287-298.]

## CONTENTS

	PAGE
Introduction .....	134
Ecological Considerations .....	135
Geographical Considerations .....	135
Systematic Considerations .....	135
Restriction of Synonymies .....	136
Measurements .....	136
Acknowledgment .....	136
Systematic Discussion .....	137
Tribe Brachyura	
Subtribe Brachygnatha	
Superfamily Brachyrhyncha	
Family Portunidae	
<i>Portunus (Portunus) xantusii</i>	
(Stimpson) .....	137
<i>Portunus (Portunus) acuminatus</i>	
(Stimpson) .....	137
<i>Portunus (Portunus) asper</i>	
(A. Milne Edwards) .....	138
<i>Portunus (Portunus) panamensis</i>	
(Stimpson) .....	138
<i>Portunus (Achelous) brevimanus</i>	
(Faxon) .....	139
<i>Portunus (Achelous) pichilinquai</i>	
Rathbun .....	139

<i>Portunus (Achelous) affinis</i>	
(Faxon) .....	139
<i>Portunus (Achelous) tuberculatus</i>	
(Stimpson) .....	140
<i>Portunus (Achelous) iridescens</i>	
(Rathbun) .....	141
<i>Callinectes arcuatus</i> Ordway.....	141
<i>Callinectes toxotes</i> Ordway.....	142
<i>Arenaeus mexicanus</i>	
(Gerstaecker) .....	142
<i>Cronius ruber</i> (Lamarck).....	143
<i>Euphylax dovii</i> Stimpson .....	144
<i>Euphylax robustus</i>	
A. Milne Edwards .....	145
Family Xanthidae	
<i>Medaeus lobipes</i> Rathbun.....	145
<i>Medaeus spinulifer</i> (Rathbun)...	146
<i>Xanthodius stimpsoni</i>	
(A. Milne Edwards) .....	146
<i>Hexapanopeus costaricensis</i> Garth	146
<i>Hexapanopeus nicaraguensis</i>	
(Rathbun) .....	147
<i>Hexapanopeus orcutti</i> Rathbun...	147
<i>Hexapanopeus sinaloensis</i> Rathbun	147
<i>Hexapanopeus beebei</i> , new species	148
<i>Panopeus purpureus</i> Lockington..	149
<i>Panopeus bermudensis</i>	
Benedict & Rathbun.....	149
<i>Eurytium tristani</i> Rathbun	
<i>Eurytium tristani minor</i> (Bott),	
new combination .....	149
<i>Micropanope polita</i> Rathbun ....	150
<i>Micropanope xantusii</i> (Stimpson)	150
<i>Micropanope (?) maculatus</i>	
(Rathbun) .....	151
<i>Paraxanthias taylori</i> (Stimpson) ..	151
<i>Menippe obtusa</i> Stimpson.....	151
<i>Pilumnus pygmaeus</i> Boone.....	151
<i>Pilumnus limosus</i> Smith.....	151
<i>Pilumnus stimpsonii</i> Miers.....	152
<i>Heteractaea peterseni</i> Garth.....	152
<i>Quadrella nitida</i> Smith.....	152

<sup>1</sup>Contribution No. 1011, Department of Tropical Research, New York Zoological Society.

<sup>2</sup>Contribution No. 243, Allan Hancock Foundation, University of Southern California.

Family Goneplacidae

<i>Pseudorhombila xanthiformis</i>	
Garth .....	154
<i>Euryplax polita</i> Smith.....	154
<i>Chasmophora macrophthalma</i>	
(Rathbun) .....	154
<i>Speocarcinus granulimanus</i>	
Rathbun .....	154
<i>Speocarcinus californiensis</i>	
(Lockington) .....	155
<i>Speocarcinus ostreaticola</i> Rathbun	155
<i>Chasmocarcinus latipes</i> Rathbun..	155
<i>Hexapus williamsi</i> Glassell.....	156

Family Cymopoliidae

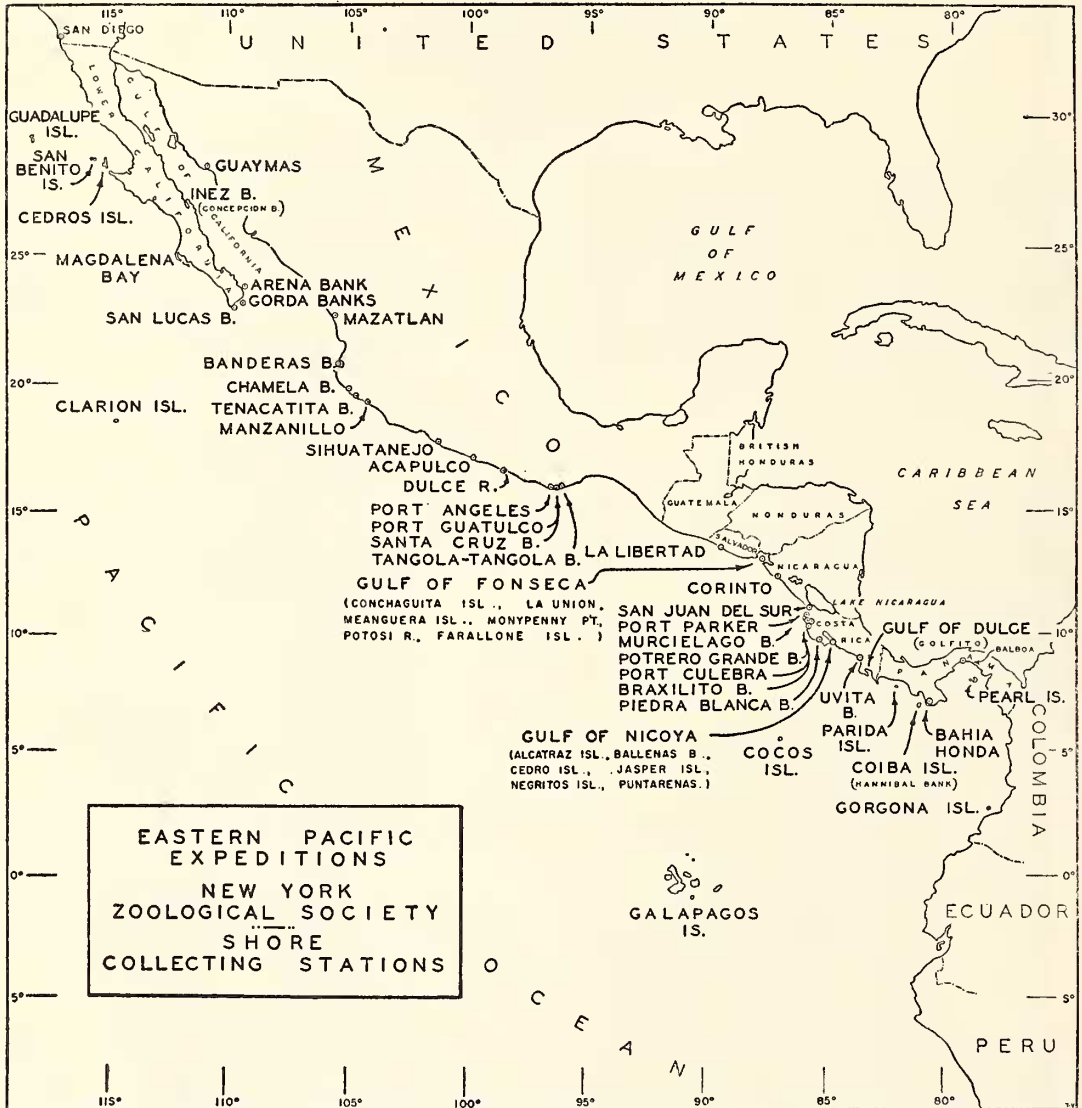
<i>Cymopolia lucasii</i> (Rathbun)....	156
--	-----

Literature Cited .....	156
------------------------	-----

INTRODUCTION

THE brachygnathous crabs of the families Portunidae, Xanthidae, Goneplacidae and Cymopoliidae constitute the subject matter of the second part of this paper, the Majidae and Parthenopidae having been treated in part one. The Pinnotheridae are not included, since they present problems in identification not encountered in the other families, which for the area covered are much better known.

The general statements made in the introduction to part one apply equally to part two. Insofar as these were restricted to the Oxyrhyncha, however, they need supplementation for the



TEXT-FIG. 1. Shore collecting stations of the Eastern Pacific Expeditions of the New York Zoological Society. For exact locations of associated dredge stations, refer to *Zoologica*, vol. XXII, no. 2, and vol. XXIII, no. 14.

Brachyryncha. Of this group the cancrioid or cyclometopous crabs were the subject of monographic treatment as recently as Rathbun (1930), while the grapsoid or catometopous crabs have received no comprehensive survey since Rathbun (1918). It is to be expected, therefore, that the largest number of new records will be found among the latter group.

#### ECOLOGICAL CONSIDERATIONS

As in the earlier part of this report, the field notes on color, behavior and food habits provided by Miss Jocelyn Crane have been utilized freely and fully to supplement the routinely systematic portions of this paper. Of the 15 species of Portunidae, color in life is recorded for all but a few; these perhaps were not recognized as different in the field. Color notes on populations of the same species from widely separated localities are included in order to establish a basis for a future consideration of the geographical variation of color and pattern. Notes on behavior are given for *Portunus (Achelous) tuberculatus*, *Callinectes arcuatus* and *Cronius ruber*. The food habits of *Arenaeus mexicanus* are discussed, and the use of *Euphyllax dovii* and *E. robustus* as food for the fish, *Caranx caninus*, is mentioned. Among the Xanthidae, color in life is recorded for but 9 of the 21 species, and usually from but a single locality. Color notes for the Goneplacidae and Cymopoliidae are not available.

The species that are duplicated from Crane's (1947) report on the intertidal forms are few in number. All come from her vertical zones 3 to 7, inclusive. Common to zone 3 (stones near low tide level) are *Xanthodius stimpsoni* and *Pilumnus pygmaeus*. Common to zone 4 (tide-pools) are the above two plus *Menippe obtusa*. Common to zone 5 (*Pocillopora* coral) are *Medaesus spinulifer*, *Xanthodius stimpsoni* and *Micropanope xantusii*. Common to zones 6 and 7 (mangroves and mudflats, respectively) are *Panopeus purpureus* and *Eurytium tristiani*. The fact that the *Pocillopora* coral zone is more properly subtidal or adtidal than intertidal, and that mangrove and mudflat biotopes continue below low-tide level, was discussed in the previous section of this report (Garth, 1959). Furthermore, since the specimens of *Menippe obtusa*, *Panopeus purpureus* and *Eurytium tristiani* here reported carry no indication of depth, while *Micropanope xantusii* and *Pilumnus pygmaeus* were taken once each in a dead pearl oyster, also without indication of depth, it is possible that all five species were collected intertidally, but that lacking also evidence assigning them to a particular intertidal zone or habitat, they were

set aside for later treatment with the non-intertidal material. Certainly, they form a marginal group when considered in this category.

#### GEOGRAPHICAL CONSIDERATIONS

The present collection adds appreciably to our knowledge of distribution within the Panamic faunal province, broadly defined as extending from Lower California and the Gulf of California to southern Ecuador or northern Peru. (See Text-fig. 1).

Of species heretofore known to occur in the Gulf of California, the following may be reported as having ranges extended southward along the mainland, those marked with an asterisk having been reported previously from the Galapagos Islands (Garth, 1946) as well: *Euryplax polita* to southern Mexico, \**Micropanope (?) maculatus*, *Speocarcinus granulimanus* and *S. californiensis* to Costa Rica, *Portunus (Achelous) iridescentis* and \**Micropanope polita* to Panama. Of species known to occur in Mexico south of Cape Corrientes, *Hexapanopeus orcutti* and *Pilumnus stimpsonii* may be reported southward to Costa Rica, while of species known to occur in Costa Rica, *Hexapanopeus nicaraguensis* and *H. costaricensis* may be reported southward to El Salvador and Panama, respectively.

Of species known to occur in Peru, *Speocarcinus ostreaticola* may be reported northward to Nicaragua; known to occur in Colombia, *Pseudorhombila xanthiformis* may be reported northward to Costa Rica; known from Panama, *Pilumnus limosus* and *Chasmophora macrophthalmia* may be reported northward to west Mexico; while *Menippe obtusa* and *Pilumnus pygmaeus*, known from Nicaragua and Costa Rica, respectively, may be reported northward to southern Mexico. (See also Table I).

Three species, \**Medaesus spinulifer*, \**Micropanope polita* and *Cymopolia lucasii*, are reported for the first time from Clarion Island, Mexico. An important Panama record for *Heteractaea peterseni* links the previous records from Colombia and the Gulf of California for that species. The southern record of *Arenaeus mexicanus* of Callao, Peru, is confirmed.

#### SYSTEMATIC CONSIDERATIONS

The 45 species of Brachyryncha compare with the 44 species of Oxyryncha previously reported in part one of this paper. The number of species by families is as follows: Portunidae, 15; Xanthidae, 21; Goneplacidae, 8; Cymopoliidae, 1. While the total number of species for the eastern Pacific is not as readily available for the Brachyryncha as for the recently monographed Oxyryncha (Garth, 1958), it may be stated that of the Portunidae, largely a tropical



TABLE I. EXTENSIONS OF RANGE

	From	To
XANTHIDAE		
<i>Medaeus spinulifer</i>	Mainland	Clarion I.
<i>Hexapanopeus costaricensis</i>	Costa Rica	Panama
<i>Hexapanopeus nicaraguensis</i>	Costa Rica	El Salvador
<i>Hexapanopeus orcutti</i>	NW Mexico	Costa Rica
<i>Micropanope polita</i>	Gulf of California, Galapagos	Clarion I., Panama
<i>Micropanope (?) maculatus</i>	Gulf of California, Galapagos	Costa Rica
<i>Menippe obtusa</i>	Nicaragua	Mexico
<i>Pilumnus pygmaeus</i>	Costa Rica	Mexico
<i>Pilumnus limosus</i>	Panama	Mexico
<i>Pilumnus stimpsonii</i>	Mexico	Costa Rica
GONEPLACIDAE		
<i>Pseudorhombila xanthiformis</i>	Colombia	Costa Rica
<i>Euryplax polita</i>	Gulf of California	S Mexico
<i>Chasmophora macrophthalma</i>	Panama	Mexico
<i>Speocarcinus granulimanus</i>	Gulf of California	Costa Rica
<i>Speocarcinus californiensis</i>	Gulf of California	Costa Rica
<i>Speocarcinus ostreaticola</i>	Peru	Nicaragua
CYMOPOLIIDAE		
<i>Cymopolia lucasii</i>	Gulf of California, Galapagos	Clarion I.

family and exclusively estuarine or pelagic, the "Zaca" obtained a complete representation for the territory covered, lacking only the few endemics from Chile-Peru, the Galapagos, and the Gulf of California (the latter obtained by the "Zaca" in 1936 and reported by Crane in 1937) to complete the list of species known from the entire eastern Pacific.

Among the Xanthidae, a new species of *Hexapanopeus* is described from Corinto, Nicaragua, and the megalops of *Quadrella nitida* is described and figured for the first time. The depth range is increased for several species, among them *Pilumnus stimpsonii* and *P. limosus*. *Panopeus convexus* Bott (not A. Milne Edwards) is considered a synonym of *Eurytium tristani* Rathbun, the subspecies *minor* Bott (1955) as belonging to that species also, hence a new combination.

It is among the Goneplacidae, however, that the greatest number of "firsts" has been established. The first specimens since the types may be reported for *Pseudorhombila xanthiformis* Garth, *Speocarcinus ostreaticola* Rathbun and *Hexapus williamsi* Glassell. Moreover, each was known from but a single specimen, and the opposite sex of each is now made known, i.e., the male of *Pseudorhombila*, the female of the other two.

RESTRICTION OF SYNONYMIES

In keeping with the format established in the earlier section of this report, synonymies are

restricted to the original description, the first use of the name in its current combination, and the citation placing it in the territory covered, if not included in the above two. Reference is also made to the appropriate monograph of Rathbun, either the cancrioid (1930) or the grapsoid (1918) volume, and to all reported occurrences of the species in the eastern tropical Pacific since then.

MEASUREMENTS

To the total length of the largest and smallest specimen examined in each class, male, female and ovigerous female, as given for the Oxyrhyncha, a second measurement, that of total width including spines, if any, has been added. In the Portunidae, where length of lateral spine is frequently a diagnostic character, a third measurement, width excluding spines, is given. Thus the figures 14.5 × 29.5 (21.5) imply length and breadth with (and without) lateral spines. The figures 29.5 — 21.5 divided by 2 will give the length of the lateral spine, in this case, 4 mm.

ACKNOWLEDGMENT

In addition to those to whom gratitude was expressed in the earlier part of this study, the writer wishes to thank Dr. Jens W. Knudsen, Pacific Lutheran College, Tacoma, Washington, an authority on larval development of the Xanthidae, for the illustration of the magalops of *Quadrella nitida* that appears as Text-fig. 2.



## SYSTEMATIC DISCUSSION

## Tribe BRACHYURA

## Subtribe BRACHYGNATHA

## Superfamily BRACHYRHYNCHA

## Family PORTUNIDAE

*Portunus (Portunus) xantusii* (Stimpson)

*Achelous xantusii* Stimpson, 1860, p. 222.

*Portunus (Portunus) xantusii*, Rathbun, 1923, p. 620 (part); 1930, p. 50, pl. 18. Glassell, 1935, p. 105.

Not *Portunus (Portunus) xantusi*, Boone, 1930, p. 163, pl. 56, figs. A, B.

*Range*.—From Santa Barbara, California (Glassell), to Cape San Lucas, Lower California; Gulf of California at Agua Verde and Concepción bays. (Rathbun, 1930).

*Material Examined*.—San Benito Islands, west coast of Lower California, Mexico, November 9, 1937, Station 178, L-1 (night light), 8 males, 2 females.

*Measurements*.—Male specimen,  $15.6 \times 31.2$  (22.6) mm., female specimen,  $14.5 \times 29.5$  (21.5) mm.

*Habitat*.—Pelagic.

*Color in Life*.—Exceedingly variable: dullest specimen grayish speckled with black and white, pepper-and-salt fashion. Tips of legs, including chelae, pinkish; ambulatories banded white and brown. Brightest specimen pinkish pepper-and-salt with entire gastric region raspberry red. Others pinkish pepper-and-salt with anterolateral margin and that of front ringed, well inside spines, with black. One with carapace and chelae mottled brown, on the carapace a Y of brown, the prongs extending from the inner margins of the eyes to gastric region, the base along midline through cardiac and intestinal regions to posterior edge of carapace. Gastric and frontal regions between forks of Y rosy pink. Chelae with pinkish chestnut band across base and another across tips. Ambulatories overcast with pink above and below. (J. Crane, field notes).

*Remarks*.—A megalops possibly of this species was taken at the same time as the adults; it is translucent with large black spots.

*Portunus (Portunus) acuminatus* (Stimpson)

*Achelous acuminatus* Stimpson, 1871, p. 112.

*Portunus (Portunus) acuminatus*, Garth, 1940, p. 73, pl. 19, figs. 1-3; 1948, p. 33. Not Rathbun, 1930, p. 56, pl. 19.

*Range*.—From Isabel Island, Mexico, to La Libertad, Ecuador. 2-50 fathoms. (Garth, 1948).

*Material Examined*.—88 specimens from 12 stations:

## Mexico

Manzanillo, November 22, 1937, Station 184, D-2, 30 fathoms, 29 males, 26 females (8 ovigerous).

17 mi. SE  $\times$  E of Acapulco, November 29, 1937, Station 189, D-1, 20 fathoms, 1 male.

4 mi. SSW of Maldonado Point, November 30, 1937, Station 192, D-1, D-2, 26-33 fathoms, 2 males.

Port Guatulco, Station 195, December 4, 1937, D-2, 3 fathoms, 2 young; December 6, 1937, D-11, 5 fathoms, 1 young; D-12, 6 fathoms, 1 young; December 7, 1937, D-19, 17 fathoms, 2 young.

Tangola-Tangola Bay, Station 196, December 9, 1937, D-6, D-7, 7-6 fathoms, 2 young; December 12, 1937, D-14, D-15, 5 fathoms, 3 young; December 13, 1937, D-16, 16 fathoms, 2 young.

## Nicaragua

Corinto, January 7, 1938, Station 200, D-27 to D-30, 3 fathoms, 2 young males.

## Costa Rica

Port Parker, Station 203, January 20, 1938, D-1 to D-3, 10-15 fathoms, 2 males, 2 females (1 ovigerous); January 22, 1938, D-11, 2-4 fathoms, 1 male.

Port Culebra, January 30, 1938, Station 206, D-2, 14 fathoms, 1 female, 1 young.

Cedro Island, Gulf of Nicoya, February 13, 1938, Station 213, D-1 to D-10, 4-10 fathoms, 1 young.

14 mi. S  $\times$  E of Judas Point, March 1, 1938, Station 214, D-2, D-3, 43-50 fathoms, 1 male.

Golfito, Gulf of Dulce, March 9, 1938, Station 218, D-4, D-5, 6 fathoms, 1 young male.

## Panama

Bahia Honda, March 18, 1938, Station 222, D-1 to D-3, D-5, 3-11 fathoms, 3 young.

*Measurements*.—Males from  $9.3 \times 18.5$  (14.3) to  $16.0 \times 41.9$  (27.2) mm., females from  $8.0 \times 16.4$  (12.1) to  $16.2 \times 37.7$  (26.8) mm., ovigerous females from  $8.0 \times 16.4$  (12.1) to  $15.3 \times 36.2$  (26.0) mm., young from  $5.0 \times 9.0$  (7.3) mm.

*Habitat*.—Shelly mud, shelly sand; gravelly mud, gravelly sand; sandy mud; crushed shell; mangrove leaves; rock; dead coral.

*Color in Life*.—Of an Acapulco, Mexico, specimen: Chestnut mottled with darker. Of Manzanillo, Mexico, specimens: "Plain" and "orange branchialed"; eggs raspberry. Gastric spot present or absent as in *Portunus (Achelous) affinis*. (J. Crane, field notes.)

**Remarks.**—The identification of this and the following two species of *Portunus* (*Portunus*) occurring widely throughout the Panamic Province has been facilitated by a prior study (Garth, 1940, p. 73) based on Hancock Expedition material in which the true *P. (P.) acuminatus* (Stimpson) was recognized and a neotype established. The result was to accord equal and full specific rank to *acuminatus* (Stimpson), *panamensis* (Stimpson), and *asper* (A. Milne Edwards) [= *transversus* (Stimpson)], rather than to consider them members of the so-called "*acuminatus-asper-panamensis* group" (Rathbun, 1930, p. 53). The acuminate lateral spine and the slender, almost filiform chelae are diagnostic, now that ample material is available to show these distinctive features.

***Portunus (Portunus) asper*** (A. Milne Edwards)  
*Neptunus asper* A. Milne Edwards, 1861, p. 325, pl. 30, figs. 3-3c.

*Portunus (Portunus) asper*, Rathbun, 1930, p. 56, pl. 20, figs. 2, 3, pl. 21, pl. 22, figs. 1, 2. Garth, 1948, p. 33; 1957, p. 36, synonymy.

**Range.**—From Mazatlan, Mexico, to Chile. To 16 fathoms. (Garth, 1957).

**Material Examined.**—33 specimens from 10 stations:

#### Mexico

17 mi. SE × E of Acapulco, November 29, 1937, Station 189, D-1 to D-3, 13-20 fathoms, 2 males, 1 ovigerous female.

Mouth of Dulce River, November 30, 1937, Station 191, D-1, 8 fathoms, 1 male, 1 young.

Port Guatulco, December 6, 1937, Station 195, D-11, 5 fathoms, 1 young; D-12, 6 fathoms, 1 male.

Tangola-Tangola Bay, Station 196, December 9, 1937, D-1, D-2, D-5, 5-9 fathoms, 4 young; December 13, 1937, D-16, 16 fathoms, 2 males, 1 female, 1 young.

#### El Salvador

Meanguera Island, Gulf of Fonseca, December 23, 1937, Station 199, D-1, 16 fathoms, 1 male.

#### Costa Rica

Murcielago Bay, January 23, 1938, Station 204, D-1, D-2, D-4, 2-4 fathoms, 2 young.

Port Parker, January 30, 1938, Station ?, depth ?, 1 young male.

Piedra Blanca Bay, Station 208, February 1, 1938, L-1, surface at light, 1 male, 1 ovigerous female, 7 young; February 5, 1938, D-1 to D-3, D-6, D-7, D-9, 3-6 fathoms, 1 male, 2 young.

Cedro Island, Gulf of Nicoya, February 21, 1938, Station 213, L-1, surface at light, 1 male.

Golfito, Gulf of Dulce, March 7, 1938, Station ?, depth ?, 1 female without chelipeds.

**Measurements.**—Males from  $10.2 \times 22.0$  (15.9) to  $41.9 \times 96.5$  (69.3) mm., females from  $14.7 \times 32.8$  (23.7) to  $39.6 \times 85$  (65.2) mm., ovigerous females from  $38.1 \times 85.5$  (61.7) mm., young from  $5.2 \times 9.3$  (7.6) mm.

**Habitat.**—Sand, mud, sandy mud, gravelly sand, crushed shell, rocks, algae.

**Color in Life.**—Of Piedra Blanca, Costa Rica, specimens: 39 mm. ovigerous female and 20 mm. male olive buff above except for white-tipped spines. Carpus, manus and dactyls of ambulatories (but not of swimming legs) lilac. Swimming legs with posterior half of paddle only lilac. Middle of fixed finger with a band of brick red; tips of both dactyls white. Underparts white. Eggs bright orange. 11 mm. young lack the violet and are grayer, not buffy, with suggestions of red bar across fixed finger. (J. Crane, field notes).

Of Gulf of Fonseca, El Salvador, male: Carapace and all legs pale olive brown; a white spot on posterior lateral margin. Movable dactyl dull violet basally, distal part and fixed finger white; dactyls of ambulatories rose red, tips white, distal half of swimmerets violet red. (J. Crane, field notes).

Of Acapulco, Mexico, specimens: Carapace and chelipeds pale olive brown, ridges darker. Ambulatories and cheliped wine colored. Manus and dactyls of swimmerets white with two longitudinal stripes of dark brown or pale buff. One patch faintly visible on posterolateral region of large male; below this, on margin, a white spot. (J. Crane, field notes). Underside white.

**Remarks.**—The broad anterolateral arc and teeth that show little reduction are characters useful in separating this species from both *Portunus (P.) acuminatus* and *P. (P.) panamensis*, while the heavier cheliped will serve to separate this species from *P. (P.) acuminatus* even in the young, where the relative lengths of the lateral spines might not suffice.

***Portunus (Portunus) panamensis*** (Stimpson)

*Achelous panamensis* Stimpson, 1871, p. 112.

*Portunus (Portunus) panamensis*, Rathbun, 1910, pp. 577, 610; 1930, p. 58, pl. 20, fig. 1, pl. 22, fig. 3, pls. 23, 24. Finnegan, 1931, p. 626, text-fig. 5. Garth, 1948, p. 34.

**Range.**—From Panama Bay to Bay of Sechura, Peru (from Angeles and Mulege Bays, Gulf of California, Mexico, only if Rathbun's synonymy of *Amphitrite paucispinis* Lockington be accepted). To 33 fathoms. (Garth, 1948).

**Material Examined.**—115 specimens from 6 stations:



## Nicaragua

Corinto, January 5, 1938, Station 200, D-12 to D-19, 1-13 fathoms, 2 young.

## Costa Rica

Port Parker, Station 203, January 20, 1938, D-1 to D-3, 10-15 fathoms, 29 males, 24 females (10 ovigerous), 1 young; January 22, 1938, D-4, 7 fathoms, 3 males, 3 females; D-6, 1 fathom, 1 young; D-7, 9-5 fathoms, 1 female; D-8, 9 fathoms, 1 female; D-9, 1.5-4 fathoms, 1 male, 1 female; D-11, 2-4 fathoms, 1 male, 1 ovigerous female; D-12, 2 fathoms, 1 male; D-15, 9-2 fathoms, 2 males, 2 females, 1 young.

?Golfito, Gulf of Dulce, March 9, 1938, Station 218, D-8, 6 fathoms, 1 male, 1 young.

## Panama

Bahia Honda, March 18, 1938, Station 222, D-1 to D-3, D-5, 3 fathoms, 2 males, 3 females, 2 young.

## Colombia

At sea near Gorgona Island, March 27, 1938, from mangrove seeds floating in tide rip, 5 young, questionably of this species.

Gorgona Island, March 31, 1938, Station 232, D-1, 2-8 fathoms, 1 male, 25 young.

*Measurements*.—Males from  $4.4 \times 6.7$  (6.0) to  $11.2 \times 22.0$  (17.6) mm., females from  $4.5 \times 7.3$  (6.2) to  $11.0 \times 21.5$  (16.8) mm., ovigerous females from  $5.5$  to  $9.1$  (7.8) to  $8.6 \times 15.6$  (12.7) mm., young from  $3.0 \times 5.0$  mm. All but the largest male came from the first Port Parker series.

*Habitat*.—Sandy and shelly mud, shelly sand, crushed shell, gravel, rocks, coral, algae, and mangrove leaves. (These all from Station 203).

*Remarks*.—A small species, as shown by the size of the ovigerous females, which would be in the size range of young in either the *Portunus* (*Portunus*) *asper* or *P. (P.) acuminatus* series. The young taken at sea off Gorgona Island, the largest of which is only 3.5 mm. in length by 5.6 mm. in width, may be of two species. The two larger specimens show the alternation of large and small anterolateral teeth expected in *P. (P.) panamensis*; the three smaller specimens have anterolateral teeth of equal size, as in *P. (P.) asper*. The species finds its optimum conditions in the shallow bays of Costa Rica and Panama, judging from the tremendous breeding population found by the "Zaca" at Port Parker, and occurs sparingly to the north and south.

*Portunus (Achelous) brevimanus* (Faxon)

*Achelous spinimanus*, Faxon, 1895, p. 23. Not *Portunus spinimanus* Latreille.

*Achelous brevimanus* Faxon, 1895, p. 23.

*Portunus (Achelous) brevimanus*, Rathbun, 1898, p. 593 (part: not the Galapagos specimens); 1930, p. 68, pls. 29, 30.

?*Portunus (Achelous) spinimanus*, Finnegan, 1931, p. 628. Not *Portunus spinimanus* Latreille.

*Range*.—Revilla Gigedo Islands, Mexico, and Cocos Island, Costa Rica. (Rathbun, 1930).

*Material Examined*.—2 specimens from 2 Revilla Gigedo Islands stations: Sulphur Bay, Clarion Island, May 11, 1936, from night light, 1 male. 3 mi. off Pyramid Rock, Clarion Island, May 12, 1936, Station 136, D-2, 55 fathoms, 1 female.

*Measurements*.—Male  $8.4 \times 14.3$  (11.3) mm., female  $17.6 \times 28.0$  (23.8) mm.

*Habitat*.—Not given.

*Remarks*.—Aside from the suggestion by Glassell (1934, p. 454) that specimens from Perlas Islands, Panama, and Puntarenas, Costa Rica, attributed to *Portunus (Portunus) xantusii* (Stimpson) by Boone (1930, p. 163, pl. 56, figs. A, B), might instead represent Faxon's species, a suggestion questioned by this writer, *P. (Achelous) brevimanus* has not been reported from the Central or South American mainland, unless specimens from Gorgona Island attributed to the Atlantic *P. (Achelous) spinimanus* Latreille by Finnegan (1930) be of this species. Specimens from the Galapagos Islands earlier attributed to *P. (A.) brevimanus* by Rathbun (1898) were subsequently described by her (1902) as *P. (A.) stanfordi*.

*Portunus (Achelous) pichilinquai* Rathbun

*Portunus (Achelous) pichilinquai* Rathbun, 1930, p. 78, pl. 37. Crane, 1937, p. 67.

*Range*.—From Magdalena Bay, west coast of Lower California, and Cape Tepoca, Gulf of California, to Cape San Lucas. 0.5 to 33 fathoms. (Crane, 1937).

*Material Examined*.—San Lucas Bay, Lower California, Mexico, November 13, 1937, Station 135, D-27, 2-6 fathoms, 1 young male.

*Measurements*.—Young male,  $6.0 \times 9.8$  (8.2) mm.

*Habitat*.—Sand bottom.

*Color in Life*.—Mottled olive and grayish and black. Legs grayish banded with black. Under-side pure white. (J. Crane, field notes).

*Remarks*.—The single specimen was taken in the same dredge haul with *Arenaeus mexicanus*.

*Portunus (Achelous) affinis* (Faxon)

*Achelous affinis* Faxon, 1893, p. 155 (part: not the Guaymas, Mexico, specimens); 1895, p. 23.



*Portunus (Achelous) affinis*, Rathbun, 1898, p. 595; 1930, p. 80, pls. 38, 39.

*Portunus affinis*, Coventry, 1944, p. 538.

**Range.**—From Cape San Lucas, Lower California, Mexico, to Ecuador. (Rathbun, 1930).

**Material Examined.**—59 specimens from 5 stations:

#### Mexico

Tenacatita Bay, November 21, 1937, Station 183, D-2, D-3, 30-40 fathoms, 4 males, 6 females.

Manzanillo, November 22, 1937, Station 184, D-2, 30 fathoms, 7 males, 7 females (5 ovigerous).

Port Guatulco, Station 195, December 3-5, 1937, light, 1 male; December 6, 1937, D-13, 8 fathoms, 2 young; D-16, 10 fathoms, 1 male, 7 young; December 7, 1937, D-17, 6 fathoms, 1 young; D-19, 17 fathoms, 1 young male; D-20, 23 fathoms, 2 males; D-21, 18 fathoms, 1 young male.

Tangola-Tangola Bay, Station 196, December 9, 1937, D-1, D-2, D-5, 5 fathoms, 3 young; D-6, D-7, 7-6 fathoms, 1 young; December 13, 1937, D-16, 16 fathoms, 1 young; D-17, 23 fathoms, 13 young.

#### Colombia

Gorgona Island, March 31, 1938, Station 232, D-1, 2-8 fathoms, 1 young.

**Measurements.**—Males from  $8.0 \times 12.5$  (11.2) to  $25.4 \times 44.6$  (38.4) mm., females from  $14.8 \times 25.1$  (22.0) to  $21.1 \times 36.8$  (30.9) mm., ovigerous females from  $16.0 \times 27.3$  (24.0) to  $21.1 \times 36.8$  (30.9) mm., young from  $4.0 \times 5.9$  mm.

**Habitat.**—Sand, mud, sandy mud; gravelly sand, gravelly mud; crushed shell.

**Color in Life.**—Of Tenacatita Bay specimens: Apricot buff, striations brown, chelipeds and ambulatories, especially inner sides of manus and dactylus, streaked with violet. A constant white spot in middle of posterolateral margin.

Of Manzanillo specimens: White spot on gastric region and spot above base of swimming legs on abdomen may be present, absent, or faint. Posterolateral spot, however, constant. Eggs raspberry. (J. Crane, field notes).

**Remarks.**—This species is at once separated from the *Portunus (Portunus)* species of the Panamic Province with which it ranges coextensively by its short lateral spine and spinulous merus of the fourth ambulatory (or natatory) leg. In the latter respect it resembles *P. (P.) xantusii* of southern California—west coast of Lower California.

*Portunus (Achelous) tuberculatus* (Stimpson)

*Achelous tuberculatus* Stimpson, 1860, p. 223.

*Portunus (Achelous) tuberculatus*, Rathbun, 1898, p. 596; 1930, p. 90, pl. 44. Finnegan, 1931, p. 629. Crane, 1937, p. 68. Garth, 1946, p. 421, pl. 71, fig. 2; 1948, p. 34.

**Range.**—From Cape San Lucas, Lower California, Mexico, to off Ecuador. Galapagos Islands. 3-70 fathoms. (Garth, 1948).

**Material Examined.**—200 specimens from 6 stations:

#### Mexico

Chamela Bay, November 17, 1937, Station 182, D-4, 16 fathoms, 1 female.

Port Guatulco, Station 195, December 4, 1937, D-3, 3.5 fathoms, 1 female; December 5, 1937, D-8, D-9, 6-7 fathoms, 4 males, 6 females; December 7, 1937, D-16, 10 fathoms, 2 males, 11 young; D-17, 6 fathoms, 1 male, 2 females, 4 young; D-18, 6 fathoms, 8 males, 6 females.

Tangola-Tangola Bay, Station 196, December 9, 1937, D-1, D-2, D-5, 5-9 fathoms, 1 female, 3 young; D-6, D-7, 6-7 fathoms, 2 males, 2 females (1 ovigerous), 26 young; D-8, 9 fathoms, 4 males, 2 females, 43 young; December 12, 1937, D-9 to D-12, 4.5 to 7.5 fathoms, 3 young; D-13, 10 fathoms, 1 male, 4 young; D-14, D-15, 5 fathoms, 3 males, 3 females (2 ovigerous), 27 young; December 13, 1937, D-16, 16 fathoms, 1 young.

#### Costa Rica

Port Parker, Arriba rocks, January 16-17, 1938, 2 males; Station 203, January 22, 1938, D-11, 2-4 fathoms, 1 female.

Piedra Blanca Bay, February 5, 1938, D-1 to D-3, D-6, D-7, D-9, 3-6 fathoms, 1 male, 1 young.

#### Colombia

Gorgona Island, March 31, 1938, Station 232, D-1, 2-8 fathoms, 1 male, 1 female, 22 young.

**Measurements.**—Males from  $6.0 \times 11.6$  (8.6) to  $11.3 \times 26.4$  (18.3) mm., females from  $6.9 \times 14.4$  (10.5) to  $10.2 \times 22.9$  (16.0) mm., ovigerous females from  $7.8 \times 15.1$  (11.2) to  $9.0 \times 18.5$  (13.7) mm., young from  $4.6 \times 7.3$  (6.3) mm.

**Habitat.**—Predominantly sand, often with crushed shell or algae; occasionally rock; rarely mud.

**Color in Life.**—Of Chamela Bay, Mexico, female: General color light brown marbled with black; base of lateral spines tinged with crimson. Legs barred cream and brown. Underparts white (J. Crane, field notes).

**Behavior.** — Kept alive in aquarium in 2½ inches of water on native sand (coarse sandy bottom with tiny shells). Much more responsive to light than *Cycloes* and more nervous and active; continually changing position, burrowing quickly in sand, hind end first. Digs with ambulatories, kicking sand out forward to chelipeds. Sinks all of self except front and eyes. (J. Crane, field notes).

**Remarks.** — Of small size but distinctively ornamented with tubercles, and bearing a spine at the posterolateral angles of the carapace, as well as a long, straight lateral spine, *Portunus (Achelous) tuberculatus* is easily segregated from the several other species of *Portunus* with which it customarily occurs, often in the same dredge hauls.

***Portunus (Achelous) iridescens* (Rathbun)**

*Neptunus (Hellenus) iridescens* Rathbun, 1893, p. 240.

*Portunus (Achelous) iridescens*, Rathbun, 1930, p. 93, pl. 46. Crane, 1937, p. 66.

*Portunus (Achelous) spinicarpus*, Finnegan, 1931, p. 628. Not *Achelous spinicarpus* Stimpson.

**Range.**—From off Santa Margarita Island, west coast of Lower California, and from off Diggs Point to off La Paz Bay, Gulf of California, Mexico. 18-112 fathoms. (Rathbun, 1930). Gorgona Island. (Finnegan).

**Material Examined.**—31 specimens from 2 stations:

**Costa Rica**

14 mi. S × E of Judas Point, March 1, 1938, Station 214, D-2, D-3, 50 fathoms, 13 males, 13 females (6 ovigerous).

**Panama**

Gulf of Chiriqui, March 13, 1938, Station 221, D-3 to D-5, 35-40 fathoms, 2 males, 3 females.

**Measurements.**—Males from 14.4 × 29.3 (21.5) to 24.7 × 48.0 (36.5) mm., females from 16.2 × 31.0 (24.9) to 25.3 × 48.5 (37.4), ovigerous females from 17.0 × 36.3 (25.6) to 21.1 × 42.7 (31.3) mm.

**Habitat.**—Mud; sandy mud.

**Color in Life.**—Not recorded.

**Remarks.**—Distinguished from all other Pacific Portunidae by the long inner carpal spine, a character shared with the Atlantic *Portunus (Achelous) spinicarpus* (Stimpson). The Costa Rican and Panamanian localities above would represent the first records for the species from the Bay of Panama, were it not for the previous report of the "St. George" from Gorgona Island,

Finnegan (1931) attributing it to the Atlantic species.

***Callinectes arcuatus* Ordway**

*Callinectes arcuatus* Ordway, 1863, p. 578. Rathbun, 1930, p. 121, pl. 52. Garth, 1948, p. 35; 1957, p. 36, synonymy. Holthuis, 1954, p. 27. Bott, 1955, p. 56.

**Range.**—From Anaheim Slough, California, to ? south Chile. (Garth, 1957).

**Material Examined.**—100 specimens from 13 stations:

**Mexico**

Chamela Bay, North Lagoon, November 17, 1937, 1 male, 3 females (2 ovigerous).

Acapulco Beach, November 26-28, 1937, 1 male.

**Honduras**

Cutuco and Potosi Lights, Gulf of Fonseca, December 20, 1937, 4 males, 6 females, 3 young.

**El Salvador**

La Union, Gulf of Fonseca, December 27, 1937, Station 199, D-8 to D-16, 5-6 fathoms, 1 female.

**Nicaragua**

Corinto, December 29, 1937, Station 200, D-7, 2 fathoms, 1 young; January 7, 1938, D-20 to D-26, 1.5-6.5 fathoms, 2 young. Castenones Lagoon and mid-harbor, January 6, 1938, 4 males, 4 females.

**Costa Rica**

Port Parker, January 13, 1938, shore, 1 male, 3 females (1 ovigerous), 4 young; January 22, 1938, Station 203, D-9, 1.5-4 fathoms, coral, 1 young.

Port Culebra, January 26, 1938, 8 males, 3 females, 2 young; January 30, 1938, 1 young male.

Piedra Blanca, February 6, 1938, 2 males, 2 females.

Cedro Island, Gulf of Nicoya, February 12, 1938, 1 male.

Golfito, Gulf of Dulce, March 5, 1938, 1 male, 1 female, 4 young; March 9, 1938, Station 218, D-4, D-5, 6 fathoms, 3 young; D-8, 6 fathoms, 2 young; same date, mudflats, 1 young.

**Panama**

Bahia Honda, March 16, 1938, 3 males, poor condition; March 19, 1938, tidepool, 1 male, lacks chelipeds.

Bella Vista, Panama City, 1944, 5 males.

**Canal Zone**

Balboa, April, 1938, night light, 3 males, 2 females, 8 young; 1940, 3 males, 5 young.



## Ecuador

Puerto Bolivar, April, 1944, 1 male.

*Measurements*.—Males from  $17.0 \times 39.6$  (29.2) to  $42.8 \times 98$  (75.2) mm., females from  $16.0 \times 35.2$  (26.4) to  $51.8 \times 102.8$  (85.7), ovigerous females from  $24.7 \times 52$  (42) to  $51.8 \times 102.8$  (85.7) mm., young from  $5.7 \times 12.9$  (10.5) mm.

*Habitat*.—Mud, shells, mangrove leaves; frequently taken in mudflats or shallow lagoons, at Gulf of Dulce "mostly salt, slightly brackish." Came often to shipside light at night. One coral station.

*Color in Life*.—Of Port Parker male: Carapace dull olive gray-green. Chelipeds olive green dorsally, whitish ventrally, washed with bluish-violet and chelae tipped with pale yellow-brown. Legs turquoise washed with olive; hairs straw gold; swimming legs olive green with suggestion of turquoise, paddles washed with black; hairs straw; tubercles at leg joints golden orange; eyes straw with brownish streaks; underparts pure white. (J. Crane, field notes).

Of Chamela Bay females: Carapace in general blue with olive pile: central portion (without pile) blue-violet; anterolateral margins deep purplish-vinaceous. Base of merus of cheliped olive, inner margin of manus blue-violet, rest of cheliped purplish. Spines of cheliped and tips of anterolateral spines white. Chelae varied, fixed finger usually tipped with white; both fingers barred with purple. Ambulatories Italian blue, hairs olive; swimming legs same with tubercles at joints and all margins narrowly violet; swimming feet sometimes turquoise green. Abdomen violet, joints white; plastron white; under sides of legs, however, colored like upper sides. (J. Crane, field notes).

*Behavior*.—Of Chamela Bay females: 8 large females [were seen] near the mouth of the lagoon, all with buffy eggs. [Each was] swimming singly, at least 25 feet away from the nearest other one. [There were] no males in the vicinity, nor were there [any] small females. (J. Crane, field notes).

*Remarks*.—In view of the overlapping ranges of this and the following species, it was considered more than likely that some of the young listed above would prove to be *Callinectes toxotes*, to which only two large males are referred. Specimens from Acapulco Beach, Mexico, Golfito, Costa Rica (Sta. 218, D-8), and Puerto Bolivar, Ecuador, all of which showed blunted or rounded frontal teeth, were compared with specimens of like size in the Hancock collections determined by M. J. Rathbun as *C. toxotes*. Not only did the "Zaca" young fail to show the nar-

row intramedial area, but they proved dissimilar from *C. toxotes* in other characters as well. It was concluded, therefore, that all young *Callinectes* obtained by the "Zaca" were *C. arcuatus*. (See also *Remarks* under the following *C. toxotes*).

*Callinectes toxotes* Ordway

*Callinectes toxotes* Ordway, 1863, p. 576. Rathbun, 1930, p. 127, pl. 54. Garth, 1948, p. 35; 1957, p. 37, synonymy. Holthuis, 1954, p. 27. Bott, 1955, p. 56.

*Range*.—From Cape San Lucas, Lower California, Mexico, to mouth of River Tumbes, Peru. Juan Fernandez Island, Chile. (Garth, 1957).

*Material Examined*.—2 specimens from as many stations:

## Costa Rica

Piedra Blanca, February 6, 1938, 1 large male.

Golfito, Gulf of Dulce, March 6, 1938, 1 large male.

*Measurements*.—The two males measured  $46.5 \times 89.2$  (76.4) and  $52.8 \times 101.3$  (87.5) mm., respectively.

*Habitat*.—Not stipulated, but presumably as in the preceding species.

*Color in Life*.—Not noted.

*Remarks*.—A more granulate species than *Callinectes arcuatus*, *C. toxotes* is further characterized by having the frontal teeth rounded, the middle pair equally advanced with the outer pair in the young. The intramedial area, that portion of the gastric region behind the posterior of the gastric carinae, is as long as its posterior width. These characters are all apparent in young from Costa Rica from among Hancock collections determined for the writer prior to 1935 by the late Mary J. Rathbun. The absence of young, and of mature females, from the "Zaca" series would indicate that *C. toxotes* is much less abundant, and that it may have narrower ecological tolerances than *C. arcuatus*.

*Arenaeus mexicanus* (Gerstaecker)

*Euctenota mexicana* Gerstaecker, 1857, p. 131, pl. 5, figs. 3, 4.

*Arenaeus mexicanus*, Faxon, 1895, p. 22. Rathbun, 1930, p. 137, pl. 58, fig. 1, pl. 61. Garth, 1948, p. 35. Holthuis, 1954, p. 28.

*Range*.—From Ballenas Bay, Lower California, and Carmen Island, Gulf of California, Mexico, to Ancon, Peru. (Garth, 1948).

*Material Examined*.—101 specimens from 18 localities:

## Mexico

San Lucas Bay, Lower California, November



13, 1937, Station 135, D-27, 2-6 fathoms, 1 male, 3 young.

Chamela Bay, lagoon shore, November 17, 1937, 2 males. Passavera Island, November 19, 1937, 1 male, 3 females (1 ovigerous).

Acapulco beach, November 26-28, 1937, 1 male.

Port Guatulco, December 3-5, Station 195, L-1 to L-3 (light), 2 females.

Tangola-Tangola Bay, Station 196, December 9, 1937, D-1, D-2, D-5, 5-9 fathoms, 9 young; December 12, 1937, D-9 to D-12, 7.5-4 fathoms, 8 young.

#### Nicaragua

Corinto, Station 200, January 5, 1938, D-12 to D-19, 3-13 fathoms, 1 male, 6 young; January 7, 1938, D-20 to D-26, 1.5-6.5 fathoms, 12 young.

San Juan del Sur, January 9, 1938, 1 carapace.

#### Costa Rica

Potrero Grande Bay, January 20, 1938, 1 male, 2 ovigerous females.

Murcielago Bay, January 23, 1938, Station 204, D-1, D-2, D-4, 2-4 fathoms, 9 young.

Piedra Blanca Bay, February 5, 1938, Station 208, D-1 to D-3, D-6, D-7, D-9, 3-6 fathoms, 1 young; February 6, 1938, 1 male.

Cedro Island, Gulf of Nicoya, February 12, 1938, 1 male, 3 females, 3 young.

Ballenas Bay, Gulf of Nicoya, [February 25, 1938], 1 male, found dead in mangroves.

Uvita Bay, March 3, 1938, seine, 6 males, 2 females.

#### Panama

Isla Parida, Gulf of Chiriqui, March 12, 1938, 1 male.

Bahia Honda, March 14, 1938, 1 male.

Pacheca Island, Pearl Islands, July 4, 1933, tidepools, "Antares," 1 male.

#### Colombia

Gorgona Island, March 28, 1938, 2 males; March 31, 1938, Station 232, D-1, 2-8 fathoms, 7 young.

#### Peru

Immediately S of Callao, 1941, 9 males, caught by natives, gift of Mrs. Sherman P. Haight.

*Measurements.*—Males from  $8.1 \times 19.1$  (13.8) to  $35.0 \times 80.3$  (60.1) mm., females from  $12.4 \times 31.0$  (21.0) to  $29.0 \times 65.5$  (47.4) mm., ovigerous females from  $17.6 \times 39.0$  (30.0) to  $29.0 \times 65.5$  (47.4) mm., young from  $4.0 \times 7.5$  (6.0) mm.

*Habitat.*—Sand, rarely with mangrove leaves, rocks, or algae.

*Food.*—Four stomachs: amphipods (2), sand, algae, and iridescent, fine nacre shell (very thin, inner layers only apparently) (2). (J. Crane, of 15 to 33 mm. specimens seined at Piedra Blanca).

*Color in Life.*—Of San Lucas Bay specimens: All mottled, gray and black, spotted with white. Underside of legs and carapace, except abdomen, speckled with black. Chelipeds and legs grayish spotted with black. Two conspicuous black spots on carapace, one on each side of mid-gastric region. (J. Crane, field notes).

Of Chamela Bay specimens: Olive-tinged pepper-and-salt with bright white spot in middle of posterior gastric region and another on intestinal region. (J. Crane, field notes).

Of Passavera, Chamela Bay, specimens: Olive spotted finely with white. Eggs bright orange. Distal segments of legs pale gray. (J. Crane, field notes).

*Remarks.*—The Haight specimens, included here for convenience although not of "Zaca" collecting, confirm the southern limit of range for the species, Callao, Peru, being just a few miles south of Ancon, where a single specimen was obtained by R. E. Coker (Rathbun, 1930).

#### *Cronius ruber* (Lamarck)

*Portunus ruber* Lamarck, 1818, p. 260.

*Cronius ruber*, Stimpson, 1860, p. 225. Rathbun, 1930, p. 139, pls. 62, 63. Finnegan, 1931, p. 630. Garth, 1946, p. 422, pl. 72, figs. 3, 4; 1948, p. 36. Holthuis, 1954, p. 28, text-fig. 10.

*Range.*—From Point San Bartolome, Lower California, Mexico, to Paíta, Peru. Galapagos Islands, 4-20 fathoms. Occurs also in the Atlantic. (Garth, 1948).

*Material Examined.*—48 specimens from 12 stations or localities:

#### Mexico

Chamela Bay, November 17, 1937, Station 182, D-1, 8 fathoms, 1 young.

Manzanillo, November 22, 1937, Station 184, D-1, 25 fathoms, 1 young.

Port Guatulco, Station 195, December 5, 1937, D-5, D-7, 2-4.5 fathoms, 2 males, 1 female, 3 young; D-8, D-9, 6-7 fathoms, 1 female, 7 young; D-8, D-9, 6-7 fathoms, 1 female; December 6, 1937, D-14, 4 fathoms, 1 female; December 7, 1937, D-18, 6 fathoms, 1 young.

Tangola-Tangola Bay, December 9, 1937, Station 196, D-6, D-7, 7-6 fathoms, 1 male, 1 young; December 12, 1937, D-14, D-15, 5 fathoms, 2 young.

## Honduras

Cutuco and Potosi Lights, Gulf of Fonseca, December 20, 1937, 1 male.

Gulf of Fonseca, date?, fumarole, 1 young, 1 ovigerous female.

## Costa Rica

Port Parker, Arriba rocks, January 15-18, 1938, 1 male, 1 female.

Port Culebra, January 30, 1938, 1 male, broken.

Piedra Blanca, February 2, 1938, 1 female; same locality, February 5, 1938, Station 208, D-1, D-2, D-3, D-6, D-7, D-9, 5 fathoms, 6 young.

## Panama

Bahia Honda, Station 222, March 18, 1938, D-1, D-2, D-3, D-5, 3-11 fathoms, 2 young.

## Colombia

Gorgona Island, March 30, 1938, 1 male; from coral, 1 ovigerous female; same date?, 2 males.

Gorgonilla Island, April 2, 1938, 1 male, 1 female, 3 young.

*Measurements.* — Males from  $10.9 \times 16.8$  (14.9) mm. to  $23.9 \times 39.3$  (35.0) mm., females from  $9.0 \times 13.0$  (11.9) mm., ovigerous females from  $15.3 \times 24.3$  (21.9) mm. to  $44.2 \times 68.0$  (59.7) mm. The largest specimen, a male from Port Culebra, is in damaged condition. It measures approximately  $47 \times 72$  mm. in length and breadth.

*Habitat.* — Off Mexico and Costa Rica, from sand bottom with algae, rocks, or crushed shell; coral. Off Panama, from mud bottom with rocks, dead coral, shell, and leaves. "Under stone completely out of water and in upper tidal zone; alive and all right."

*Color in Life.* — Of Chamela Bay young female: Dark brownish-black streaked with gray. Paddle legs chestnut brown. (J. Crane, field notes).

Of Piedra Blanca female: Carapace olive brown speckled finely with cream. Transverse ridges blue-black. A prominent oval cream spot on middle of posterolateral margin. Anterolateral spines violet tipped with reddish-brown. Chelipeds like carapace, both as to background, ridges, and spines, above, but ridges definitely dark blue or green. Lower (outer) half of chelipeds creamy white. Chelae purple, tips buffy white, a greenish spot in middle of movable dactyls above. Ambulatories mottled dark green and white. Dactyls reddish-brown. Swimming feet pumpkin orange. Underside of carapace and maxillipeds and anterior edge of sternum orange

streaked with white. Rest of sternum, abdomen, and under side of merus of ambulatories white. A purple line down middle of abdomen. Carpus to dactylus of ambulatories like upper side. (J. Crane, field notes).

Of Gulf of Fonseca ovigerous female: Dark purplish-black; pile dark buff; ridges and carapace and legs purplish-red and purplish-blue. Same color on abdominal crests. Swimmerets rusty orange. Chelae dark purple. Under side white with buffy pile, except carpus, manus, and dactylus of legs, which are like upper parts of same. Eggs buffy orange. (J. Crane, field notes).

*Behavior.*—Threatens. (J. Crane, field note).

*Remarks.* — The young of this species were frequently included in mixed lots of *Portunus* species, which they resemble greatly. The alternation of large and small anterolateral teeth and narrow carapace even suggests the subgenus *Achelous*. The presence of four spines on the manus, however, serves at once to distinguish them from all other eastern Pacific Portunidae.

*Euphyllax dovii* Stimpson

*Euphyllax dovii* Stimpson, 1860, p. 226, pl. 5, figs. 5, 5a. Rathbun, 1930, p. 147, pl. 65. Boone, 1930, p. 190, pl. 65. Garth, 1946, p. 423, pl. 72, figs. 1, 2. Coventry, 1944, p. 539.

*Euphyllax dowi*, Garth, 1957, p. 38.

*Range.*—West coast of Mexico? Panama to Talcahuano, Chile. Galapagos Islands.

*Material Examined.* — Identifiable material from 3 stations, as follows:

## Panama

Bahia Honda, March 15, 1938, fragments, food of *Caranx caninus* Günther.\*

Hannibal Bank, March 20, 1938, Station 224, D-2, D-3, 35 fathoms, 3 chelae.

22 mi. ESE of Jicaron Island, March 20, 1938, Station 226, L-1 (night light), 1 female.

*Measurements.* — Female specimen, length 23.4 mm., width 37.8 mm.

*Habitat.*—Pelagic. Frequently comes to light at night.

*Color in Life.*—Carapace and merus of all legs deep purple; other segments of legs wine red. Underside of carapace, meri of legs, and maxillipeds blue; sternum white; abdomen brownish; undersides of rest of ambulatories wine red. (J. Crane, field notes).

*Remarks.* — The three chelae from Hannibal Bank were taken in a dredge from a bottom of either rocks, mud, and dead coral or sand, shells,

\*The fish *Caranx caninus* Günther is considered by some authors to be a synonym of the Atlantic *C. hippos* (Linnaeus).



and algae. A specimen was seen by John Tee-Van swimming at the surface in daylight, on the same day, above Hannibal Bank. (J. Crane, field notes). This corresponds with the experience of the "Velero III," which encountered the crabs in numbers at Cocos Island, Costa Rica, (Garth, 1946), and of the "Askoy," which encountered them at Malpelo Island, Colombia. The observations of Dr. R. C. Murphy are recorded in Garth (1948, p. 9).

*Euphylax robustus* A. Milne Edwards

*Euphylax robustus* A. Milne Edwards, 1874, p. 249; 1879, p. 205, pl. 37. Rathbun, 1930, p. 148, pls. 66, 67. Coventry, 1944, p. 540. Garth, 1948, p. 37.

*Range*.—From Isabel Island, Mexico (Coventry), to Octavia Bay, Colombia (Garth).

*Material Examined*.—9 specimens from 5 stations:

Mexico

17 mi. SE × E of Acapulco, November 29, 1937, Station 189, D-1, 20 fathoms, 1 female.

Tangola-Tangola Bay, Station 196, December 12, 1937, D-9 to D-12, 7.5-4 fathoms, 1 young; December 13, 1937, D-17, 23 fathoms, 2 young.

Costa Rica

Port Culebra, January 30, 1938, Station 206, D-3, 14 fathoms, 2 young females.

Panama

Parida Island, Gulf of Chiriqui, March 12, 1938, 1 damaged specimen, food of *Caranx caninus*.

Bahia Honda, March 18, 1938, Station 222, D-5, 11 fathoms, 2 young.

Colombia

At sea near Gorgona Island, March 27, 1938, from mangrove seeds floating in tide rip, 1 young.

*Measurements*.—Large female, length 60 mm., width 96 mm., exorbital width 84.2 mm., frontal width 15 mm., cheliped 130 mm., chela 74 mm., dactyl 44.2 mm., height of palm 30 mm., first walking leg 116.5 mm. Young from 3.5 mm. length.

*Habitat*.—Sand, mud, sandy mud; with shell, leaves, or algae.

*Color in Life*.—Carapace and legs above gray blue-green. Chelipeds gray blue-green except olive brown manus and dactyls. Ridges and dactyls tinged with pink. Tubercles on chelipeds white. Eyestalks bright violet. Swimmerets pale horn. Abdomen barred with violet and white.

Legs barred with violet and white below. Eggs pale salmon. (J. Crane, field notes).

*Remarks*.—While credit for the rediscovery of A. Milne Edwards's lost species rightfully belongs to the Fifth George Vanderbilt Expedition (Coventry, 1944), "Zaca" scientists may consider as one of their more significant contributions the finding of a specimen of the opposite sex and of a size comparable to the 56 × 90 mm. holotype of *Euphylax robustus*. This 60 × 96 mm. female, dredged on sandy mud bottom near Acapulco, Mexico, by its detailed resemblance to A. Milne Edwards's unique male, upholds the writer's conviction, based upon the examination of immature specimens only (Garth, 1948, p. 37), that "[E.] *robustus* is a valid species and not conspecific with [E.] *dovii*, as suggested by Rathbun (1930, p. 148)." That specimens of this large and distinctive species have not escaped the eyes of discriminating collectors, but have merely failed to be reported in the literature, is attested by a pair of comparable size from Peru sent the writer by Dr. Albert Panning of the Hamburg Museum. A redescription based on this new material, together with photographs, will appear in a subsequent monograph.

Family XANTHIDAE

*Medaeus lobipes* Rathbun

*Medaeus lobipes* Rathbun, 1898, p. 583, pl. 44, fig. 1; 1930, p. 275, text-fig. 44, pl. 114. Crane, 1937, p. 70. Garth, 1946, p. 442, pl. 77, fig. 2; 1948, p. 39.

*Range*.—From Santa Inez Bay, Gulf of California, Mexico, to Guayabo Chiquito, Panama. Galapagos Islands. 5.5-150 fathoms. (Garth, 1948).

*Material Examined*.—35 specimens from 4 stations:

Mexico

Manzanillo, November 22, 1937, Station 184, D-1, 25 fathoms, 1 young male; D-2, 30 fathoms, 15 males, 13 females (1 ovigerous).

Costa Rica

Port Parker, January 20, 1938, Station 203, D-1 to D-3, 10-15 fathoms, 2 males, 1 female.

Port Culebra, January 30, 1938, Station 206, D-1, D-3, 14 fathoms, 1 male.

Golfito, Gulf of Dulce, March 9, 1938, Station 218, D-4 to D-7, 4-6 fathoms, 1 female, 1 young.

*Measurements*.—Males from 4.9 × 6.9 to 18.6 × 28.1 mm., females from 5.7 × 8.1 to 16.4 × 24.2 mm., ovigerous female 11.6 × 17.1 mm., young from 3.0 × 4.0 mm.



*Habitat*.—Sand, gravelly sand; sandy mud and crushed shell; mangrove leaves, mud, and shell.

*Color in Life*.—Of Manzanillo specimens: At least half had orange carapace of varying degrees of brightness with dark brown median longitudinal band and same brown on anterolateral angles. In the rest the orange was replaced by light brown or white. Chelipeds orange or light brown externally, white internally and on distal part of manus. Underparts white sprinkled posteriorly with brown. (J. Crane, field notes).

*Breeding*.—Mexico in late November.

*Remarks*.—The Port Culebra male, a young specimen, is granulate to the point of spinulosity.

***Medaeus spinulifer* (Rathbun)**

*Pilumnus spinulifer* Rathbun, 1898, p. 585, pl. 42, figs. 6-8. Finnegan, 1931, p. 643.

*Medaeus spinulifer*, Rathbun, 1930, 276, text-fig. 45. Garth, 1946, p. 443, pl. 75, figs. 5, 6; 1948, p. 40. Crane, 1947, p. 75.

*Range*.—From Cape San Lucas, Lower California, Mexico, to Utria Bay, Colombia. Galapagos Islands. Shore to 73 fathoms. (Garth, 1948).

*Material Examined*.—3 specimens from 2 stations:

**Mexico**

3 mi. off Pyramid Rock, Clarion Island, May 12, 1936, Station 163, D-3, D-4, 50 fathoms, 1 female.

Manzanillo, November 22, 1937, Station 184, D-2, 30 fathoms, 1 male, 1 young.

*Measurements*.—Male specimen  $9.0 \times 13.3$  mm., female specimen  $7.0 \times 10.1$  mm., young specimen  $2.6 \times 3.3$  mm.

*Habitat*.—Gravelly sand.

*Color in Life*.—Not noted.

*Remarks*.—The Manzanillo specimens were sorted out from among a large number of *Medaeus lobipes* Rathbun. The species is now recorded from the Revilla Gigedo Islands.

***Xanthodius stimpsoni* (A. Milne Edwards)**

*Xantho stimpsoni* A. Milne Edwards, 1879, p. 252, pl. 46, figs. 2-2b. Finnegan, 1931, p. 631. Buitendijk, 1950, p. 277.

*Xanthodius stimpsoni*, Rathbun, 1930, p. 315, pl. 143, figs. 5-7. Crane, 1947, p. 77. Garth, 1948, p. 41.

*Daira ecuadorensis* Rathbun, 1935, p. 49.

*Range*.—From Cape San Lucas, Lower California, Mexico, to Santa Elena Bay, Ecuador. 7-27 meters. (Garth).

*Material Examined*.—15 specimens from 3 stations:

**Mexico**

Banderas Bay, November 16, 1937, from oyster-bearing rocks, 3 young.

Port Guatulco, Station 195, December 4, 1937, D-3, 3.5 fathoms, 1 male, 1 young; D-4, 4.5 fathoms, 1 male, 2 ovigerous females, 1 young; December 5, 1937, D-5, 2 fathoms, 2 males, 2 females (1 ovigerous), 1 young.

**Nicaragua**

Corinto, January 5, 1938, Station 200, D-15, 1 fathom, 1 young.

*Measurements*.—Males from  $4.9 \times 7.2$  to  $6.2 \times 9.3$  mm., females from  $5.0 \times 7.2$  to  $6.0 \times 9.0$  mm., ovigerous females from  $5.0 \times 7.3$  to  $6.0 \times 9.0$  mm., young from  $2.8 \times 3.7$  mm.

*Habitat*.—Sand, with algae or crushed shell; mangrove leaves.

*Color in Life*.—Of Port Guatulco specimens: Carapace white speckled with violet; chelipeds bright orange; legs dark brown except last (white). (J. Crane, field notes). Marked with shades of white and dark red. (*Idem.*).

*Breeding*.—Mexico in early December.

*Remarks*.—Since depth is not mentioned in Rathbun (1930), the "Askoy" records of 6-10 feet and 7-27 meters and the "Zaca" records of 1-4.5 fathoms aid materially in defining the bathymetric range.

***Hexapanopeus costaricensis* Garth**

*Hexapanopeus costaricensis* Garth, 1940, p. 79, pl. 21, figs. 1-4.

*Range*.—From Port Parker and Puerto Culebra, Costa Rica. 3-10 fathoms. (Garth).

*Material Examined*.—14 specimens from 2 stations:

**Costa Rica**

Port Parker, January 20, 1938, Station 203, D-1 to D-3, 10-15 fathoms, 5 males, 3 females (1 ovigerous); January 22, 1938, D-7, 5-9 fathoms, 1 male, 1 female; D-8, 9 fathoms, 1 male.

**Panama**

Bahia Honda, March 18, 1938, Station 222, D-1 to D-3, D-5, 3-11 fathoms, 2 males; D-3, 8 fathoms, 1 male.

*Measurements*.—Males from  $4.1 \times 5.3$  to  $6.0 \times 7.7$  mm., non-ovigerous females from  $4.0 \times 5.5$  to  $4.6 \times 6.0$  mm., ovigerous female  $3.5 \times 4.9$  mm.

*Habitat*.—Sandy mud, crushed shell; shelly sand, algae; shelly mud; dead coral.

*Color in Life*.—Not noted.

*Breeding*.—Costa Rica in late January.

*Remarks.*—The “Zaca” records confirm those of the “Velero III” from Port Parker, the type locality, and extend the range of the species south from Costa Rica to northern Panama.

*Hexapanopeus nicaraguensis* (Rathbun)

*Lophopanopeus nicaraguensis* Rathbun, 1904b, p. 162.

*Hexapanopeus nicaraguensis*, Rathbun, 1930, p. 395, text-fig. 61.

*Range.*—Known only from the type locality, Realejo [Corinto], Nicaragua.

*Material Examined.*—4 specimens from 2 stations:

El Salvador

La Libertad, December 16, 1937, Station 198, D-1, 13 fathoms, 1 male.

Nicaragua

Corinto, Station 200, December 29, 1937, D-1, D-3, D-8, 2-6.6 fathoms, 1 male, 1 ovigerous female; January 7, 1938, D-27 to D-30, 3 fathoms, 1 male.

*Measurements.*—Males from  $4.7 \times 6.9$  to  $7.3 \times 10.6$  mm., ovigerous female  $5.4 \times 7.7$  mm.

*Habitat.*—Mud, mangrove leaves.

*Color in Life.*—Not noted.

*Breeding.*—Nicaragua in late December.

*Remarks.*—The above specimens are smaller than would be suggested by the unique male holotype, an  $8.7 \times 13$  mm. specimen. Their presence at the original locality is confirmed, Realejo being the classic locality, Corinto its modern counterpart. A fine specimen from La Libertad, which is widest opposite the last marginal tooth, extends the known range a full degree of latitude north to El Salvador.

*Hexapanopeus orcutti* Rathbun

*Hexapanopeus orcutti* Rathbun, 1930, p. 397, pl. 170, figs. 3, 4.

*Range.*—Known only from the type locality, near Modesto, Sinaloa, Mexico.

*Material Examined.*—32 specimens from 6 stations comprising 8 separate localities:

Mexico

Banderas Bay, November 16, 1937, from oyster-bearing rocks, 1 male, 5 young.

Chamela Bay, November 17, 1937, Station 182, D-3, 15 fathoms, 1 ovigerous female.

Port Guatulco, Station 195, December 4, 1937, D-1, 2.5 fathoms, 1 male; D-2, 3 fathoms, 1 male, 1 young; December 6, 1937, D-10, 4 fathoms, 1 ovigerous female.

Nicaragua

Monypenny Point, Gulf of Fonseca, December 24, 1937, Station 199, D-2, 5 fathoms, 1 male; D-5, D-6, 4-7 fathoms, 2 females (1 ovigerous).

El Salvador

La Union, Gulf of Fonseca, December 27, 1937, Station 199, D-8, 6 fathoms, 6 males, 4 females (2 ovigerous); D-17, D-21, 3-4 fathoms, 2 males, 1 female.

Costa Rica

Port Parker, January 22, 1938, Station 203, D-4, 7 fathoms, 1 female, 1 young; D-10, 2.5-6 fathoms, 1 male, 4 females (2 ovigerous).

Golfito, Gulf of Dulce, March 9, 1938, D-4 to D-7, 4-6 fathoms, 1 male, 1 female.

*Measurements.*—Males from  $3.0 \times 4.0$  to  $6.0 \times 8.3$  mm., females from  $3.0 \times 3.9$  to  $3.7 \times 5.1$  mm., ovigerous female  $3.7 \times 5.0$  mm., young from  $2.2 \times 2.8$  mm., Gulf of Fonseca specimens: males from  $4.1 \times 5.2$  to  $9.5 \times 12.6$  mm., females from  $4.0 \times 5.3$  to  $7.0 \times 9.2$  mm., ovigerous females  $4.6 \times 6.0$  to  $5.5 \times 7.2$  mm., young not present.

*Color in Life.*—Of Chamela Bay, Mexico, specimens: Black all over except ambulatories, which are barred with black and cream. Chelae tipped with cream; abdomen pale buffy. (J. Crane, field notes).

Of Port Guatulco, Mexico, specimens: Gray marked with white. (J. Crane, field notes).

*Habitat.*—Sand, algae; gravelly sand, crushed shell, dead coral; mud, mangrove leaves; gravel, algae.

*Breeding.*—Mexico in mid-November and early December; Nicaragua in late December.

*Remarks.*—As will be noted under *Measurements* above, the Gulf of Fonseca specimens (Monypenny Point, La Union) represent a giant race as compared to Mexican and Costa Rican specimens. They appear also to have longer legs and somewhat different chelae, and should perhaps on this account be segregated from the above series. It is clear, however, that the range of the species should be extended from northwest Mexico all the way to the Gulf of Dulce, Costa Rica, the depth to 15 fathoms. The Port Guatulco male has two minor chelae, possibly the result of regeneration.

*Hexapanopeus sinaloensis* Rathbun

*Hexapanopeus sinaloensis* Rathbun, 1930, p. 398, pl. 170, figs. 1, 2. Garth, 1948, p. 41.

*Hexapanopeus setipalpus* Finnegan, 1931, p. 641.

*Range.*—From Boca Tecapan, Sinaloa, Mex-



ico, to Málaga Bay, Colombia, 4-9 meters. (Garth, 1948).

*Material Examined.*—31 specimens from 6 stations:

#### Nicaragua

Meanguera Island, Gulf of Fonseca, December 23, 1937, Station 199, D-1, 16 fathoms, 2 males.

Corinto, Station 200, December 29, 1937, D-1, D-3, D-8, 2-6.6 fathoms, 1 male, 1 female; January 7, 1938, D-26, 2.5 fathoms, 1 ovigerous female; D-27 to D-30, 3 fathoms, 1 male.

#### Costa Rica

Port Parker, January 22, 1938, Station 203, D-5, 3 fathoms, 1 male; D-13, 7-9 fathoms, 1 ovigerous female.

Cedro Island, Gulf of Nicoya, February 13, 1938, Station 213, D-1 to D-10, 4-10 fathoms, 7 males, 6 females (2 ovigerous).

Golfito, Gulf of Dulce, March 9, 1938, Station 218, D-4 to D-7, 4-6 fathoms, 3 males, 3 females (2 ovigerous); D-8, 6 fathoms, 2 males, 2 young.

#### Panama

Bahia Honda, March 18, 1938, Station 222, D-3, 8 fathoms, 1 male.

*Measurements.*—Males from  $3.2 \times 4.4$  to  $5.7 \times 8.7$  mm., females from  $3.0 \times 4.0$  to  $4.2 \times 5.9$  mm., ovigerous females same; young from  $2.9 \times 3.8$  mm.

*Habitat.*—Mangrove leaves; shells and dead coral or algae; mud, sand, and crushed shell.

*Color in Life.*—Not noted.

*Breeding.*—Nicaragua in early January; Costa Rica from late January to early March.

*Remarks.*—Previously recorded from Taboga Island, Panama, as *Hexapanopeus setipalpus* Finnegan. The records for Nicaragua and Costa Rica are new.

#### *Hexapanopeus beebei*, new species

(Plate I)

*Type.*—Male holotype, A.H.F. No. 377, and male and female, paratypes, N.Y.Z.S. No. 37,718, from Corinto, Nicaragua, December 29, 1937, "Zaca" Station 200, D-1, 3, 8, 2-6.6 fathoms. For additional paratypes see *Supplementary Material* below.

*Measurements.*—Male holotype, length 5.4 mm., width 7.2 mm., of fronto-orbit 5.4 mm., of front 2.6 mm., length of cheliped 8.3 mm., of chela (lower margin) 6.1 mm., of dactyl 3.5 mm., height of palm 3.5 mm. Female paratype, length 5.2 mm., width 7.1 mm.

*Diagnosis.*—Fifth lateral tooth minute. Supra-orbital lobe advanced to level of outer orbital tooth. Fingers white, the whitened portion not continuing backward and upward on palm. Major dactyl strongly curved in male, a denticle but no large tooth at base. Male first pleopod with a reflected medial spine, an opposing lanceolate lobe, and a truncated or collared hood with three terminal setae.

*Description.*—Carapace nearly flat, almost devoid of pubescence, smooth anteriorly but granulate posteriorly, clearly divided by furrows into regions each surmounted by one or more rows of granules, disposed as follows: two protogastric, of which the posterior is the more oblique, one epibranchial, in line with the last tooth, one metagastric, interrupted at the middle, one cardiac, also medially divided, and one metabranchial; in addition to these an hepatic, in line with the anterior protogastric, and a post-frontal, in advance of the anterior protogastric. Front not exceptionally narrow, a little less than one-third carapace width, produced, thin-edged, lateral margins oblique, anterior margins somewhat oblique, straight or slightly sinuous, frontal lobes separated by a shallow but distinct median V, a suggestion of an outer lobe. Inner supra-orbital border elevated, swollen, orbital emarginations V-shaped, the included lobe equally advanced inwardly with the outer orbital tooth. Second anterolateral tooth low, rounded, and separated from the first or exorbital by a shallow sinus, their combined width greater than that of the third tooth; third tooth with a short, straight, oblique anterior margin and a long, arcuate posterior margin, tip rectangular; fourth tooth spiniform, narrower at base than third and more projecting, directed obliquely forward, anterior margin transverse or slightly concave, posterior margin straight or nearly so; fifth tooth minute, separated from fourth by a closed fissure, and appearing as a notch on the posterior margin of the fourth.

Merus of outer maxilliped subrectangular, broader than long, anterolateral angle slightly produced and rounded, anterointernal angle shallowly notched at insertion of palpus.

Chelipeds markedly unequal in the male; merus with a superior distal tubercle; carpus with a marginal carina incompletely outlining a rhomb enclosing a rectangular sulcus in its outer portion, a scattering of tubercles above; manus of major chela smooth, inflated, two parallel ridges above. Fingers white, the white "color" not continued appreciably on palm, major dactylus strongly curved, almost forming a quarter-circle, a granulate ridge above, a small denticle basally in place of the customary larger tooth;



this with a small denticle distally defining a gape into which a somewhat larger tooth of the pollex fits incompletely; pollex not deflexed. Minor manus slenderer than major, fingers elongate, ridged and compressed, meeting without a gape but with crossed tips; pollex deflexed.

Male abdomen with sides of third segment rounded, sides of fused segments 3-5 concave, narrowest at base of segment 6, segment 7 triangular with a blunt tip. Male first pleopod with a long, backward-pointing medial spine, an equally long and oppositely directed lanceolate lobe, and a rimmed hood bearing three terminal setae.

Female noticeably more convex than male, ridges more prominent, interspaces more felted. Chelipeds less robust, carpus and minor manus more nodose, palms more granulate. Fingers compressed, those of major manus meeting without a gape but possessing larger teeth than those of minor manus.

*Supplementary Material.*—In addition to specimens mentioned under *Type* above, the following specimens, also from "Zaca" Station 200: D-7, 2 fathoms, 1 female, paratype; D-27 to 30, 3 fathoms, mangrove leaves, 1 male, 1 ovigerous female, paratypes. The male has two minor chelipeds, the result of regeneration of a major cheliped.

*Remarks.* — The proposed new species is most closely allied to *Hexapanopeus caribbaeus* (Stimpson), from which it differs in having the fingers white, the whitened portion not running backward and upward on the palm, the front not especially narrowed, and the fingers of the major chela of the male conspicuously gaping.

I take pleasure in naming this diminutive panopeid for Dr. William Beebe, director emeritus of the Department of Tropical Research, New York Zoological Society, whose "Book of Bays" (1942) so delightfully describes the expedition on which it was collected.

#### *Panopeus purpureus* Lockington

*Panopeus purpureus* Lockington, 1877b, p. 101. Rathbun, 1930, p. 344, pl. 158, fig. 1, pl. 159. Crane, 1947, p. 79.

*Range.*—From Magdalena Bay, Lower California, and Guaymas, Sonora, Mexico, to mouth of Rio Tumbes, Peru. (Rathbun).

*Material Examined.*—Puntarenas, Costa Rica, February 22, 1938, 1 male.

*Measurements.* — Male specimen length 11.5 mm., width 16.5 mm.

*Habitat.* — In stony mud on edges of mangrove swamps and open mudflats. (Crane).

*Remarks.*—It was undoubtedly due to an over-

sight that the above specimen was not reported by Crane (1947), who listed the species from Culebra, Ballenas, and Golfito, Costa Rica, and Puerto Bolivar, Ecuador.

#### *Panopeus bermudensis* Benedict & Rathbun

*Panopeus bermudensis* Benedict & Rathbun, 1891, p. 376, pl. 20, fig. 2; pl. 24, figs. 14, 15. Rathbun, 1930, p. 360, pl. 165, text-fig. 56.

*Range.*—Eastern Pacific from Magdalena Bay, Lower California, Mexico, to Matapalo (near Capon), Peru. Western Atlantic from Florida and the Bahamas to Brazil. Bermuda. (Rathbun).

*Material Examined.*—Chamela Bay, Mexico, November 17, 1937, Station 182, D-1, 8 fathoms, 17 males, 6 ovigerous females.

*Measurements.*—Males from  $4.3 \times 5.7$  to  $6.3 \times 8.5$  mm., ovigerous females from  $3.9 \times 5.3$  to  $4.9 \times 6.6$  mm.

*Habitat.*—Sand and algae. Fine bits of seaweed were entwined among specimens.

*Remarks.* — When considered independently, the Chamela Bay specimens could scarcely be reconciled with specimens from Bermuda to which the name *bermudensis* was originally applied. It is when considered in the context of a larger representation of this geographically variable complex from many west coast localities that their relationship to a similar array from numerous Caribbean localities is appreciated. While as a result of studies now in progress it may be decided to segregate the Pacific material from the Atlantic as a distinct species, to do so now on the basis of a single lot of specimens from an isolated locality would be premature. The Chamela Bay specimens serve to link the present representation from Lower California and the Gulf of California with that from Central and northern South America. The small size of the females, all of which are ovigerous, is noteworthy.

#### *Eurytium tristani* Rathbun

*Eurytium tristani minor* (Bott), n. comb.

*Eurytium tristani* Rathbun, 1906, p. 100; 1910, pp. 543, 585, pl. 47, fig. 1; 1930, p. 425, pl. 176, fig. 3; pl. 177, fig. 3. Crane, 1947, p. 80.

*Panopeus convexus minor* Bott, 1955, p. 57, pl. 6, figs. 9a, 9b. (Not *P. convexus* A. Milne Edwards, 1880).

*Range.* — From El Triunfo, El Salvador, to Salto (near Capon), Peru.

*Material Examined.*—Puntarenas, Costa Rica, February 22, 1938, 26 males, 29 females (1 ovigerous), 1 young.

*Measurements.*—Males from  $3.5 \times 4.5$  to  $12.0 \times 17.8$  mm., females from  $3.7 \times 5.1$  to  $9.9 \times$

15.1 mm., ovigerous female  $6.1 \times 8.7$  mm., young  $3.2 \times 4.3$  mm.

*Habitat*.—Not stated, but most certainly from mud flats exposed at low tide.

*Color in Life*.—Not noted.

*Remarks*.—Of the two pairs of specimens from Puntarenas sent to Frankfurt, Germany, for comparison with the types of *Panopeus convexus minor* Bott, Dr. Richard Bott writes as follows: "They agree with the type in all characteristics mentioned by me; the first pleopods are completely identical." It was noted that, while in the published figure of the male holotype the left cheliped is larger than the right, among "Zaca" specimens the right cheliped is larger than the left in most instances. Dr. Bott affirms that this is also true of the remaining male from the type series of *P. convexus minor*.

The decision to transfer Bott's subspecies to Rathbun's species of another genus was the result of examining a male specimen from El Triunfo reported as *Panopeus convexus convexus* (Bott, 1955, p. 57) and loaned the writer by Dr. Bott for use in connection with studies on the family Xanthidae. This proved to be none other than *Eurytium tristani* Rathbun. It therefore follows that the somewhat smaller specimens reported by him as *Panopeus convexus minor* should be called *Eurytium tristani minor* (Bott) instead. The small size of the "Zaca" specimens, and in particular, of the ovigerous female, support their continued distinction.

#### *Micropanope polita* Rathbun

*Micropanope polita* Rathbun, 1893, p. 238; 1930, p. 440, text-fig. 40, pl. 180, figs. 3, 4, synonymy. Crane, 1937, p. 71. Garth, 1946, p. 459, pl. 77, fig. 4.

*Range*.—From Magdalena Bay, Lower California, and Santa Inez Bay, Gulf of California, Mexico, to Cocos Island, Costa Rica. Galapagos Islands. 3-150 fathoms. (Garth).

*Material Examined*.—35 specimens from 3 stations:

#### Mexico

SE of Cedros Island, Lower California, November 10, 1937, Station 126, D-19, 25 fathoms, 1 male, 1 female. From holes in rocks.

3 mi. off Pyramid Rock, Clarion Island, May 12, 1936, Station 163, D-2, 55 fathoms, 30 specimens.

#### Panama

Hannibal Bank, March 20, 1938, Station 224, D-1 to D-3, 35-40 fathoms, 1 male, 2 females.

*Measurements*.—Males from  $4.0 \times 6.0$  to  $5.4 \times 8.6$  mm., females from  $2.9 \times 4.2$  to  $4.8 \times$

$7.2$  mm. The larger specimens are from the more northerly localities.

*Habitat*.—Rocks, mud, dead coral; sand, shells, algae.

*Color in Life*.—Of Cedros Island, Mexico, specimens: Male tan and cream mottled. Front and manus rosy red. Dactyls dark brown tipped with white. Ambulatories banded tan and cream tinged with pink. Female carapace entirely crimson, but brightest on front. Chelipeds coral red. Chelae dark brown, tipped with white. Underparts pinkish. (J. Crane, field notes).

*Remarks*.—Food preferences and breeding in the southern part of the Gulf of California are discussed by Crane (1937). The records from the Revilla Gigedo Islands, of which Clarion is the most remote, and from the mainland of Panama are new.

#### *Micropanope xantusii* (Stimpson)

*Xanthodes xantusii* Stimpson, 1871, p. 105.

*Micropanope xantusii*, Rathbun, 1930, p. 438, pl. 179, figs. 1-4. Crane, 1937, p. 72; 1947, p. 80. Garth, 1946, p. 457, pl. 77, fig. 6; 1948, p. 42.

*Xanthias serrulata* Finnegan, 1931, p. 634, text-fig. 6.

*Range*.—From Arena Bank, Gulf of California, Mexico, to Santa Elena Bay, Ecuador. Galapagos Islands. (Garth, 1948). Occasionally to 40 fathoms.

*Material Examined*.—20 specimens from 3 collections made at 2 localities:

#### Mexico

Sulphur Bay, Clarion Island, May 15, 1936, coral, 1 young male.

Port Guatulco, December 4, 1937, in dead pearl oyster, 1 male; December 6, 1937, Station 195, D-15, 1.5 fathoms, 8 males, 10 females (4 ovigerous).

*Measurements*.—Males from  $3.0 \times 4.2$  to  $7.0 \times 9.8$  mm., females from  $4.0 \times 5.6$  to  $7.25 \times 11.0$  mm., ovigerous females from  $4.5 \times 6.4$  to  $6.3 \times 9.2$  mm.

*Habitat*.—Coral obtained by diving.

*Color in Life*.—Variable, but majority dark red mottled with lighter and darker. Sulci on major cheliped of adult males may be almost lacking. (Crane, 1947).

*Breeding*.—Mexico in early December.

*Remarks*.—According to Crane (1947), who reported the species from the intertidal of Mexico (Clarion Island, Sihuatenejo, Acapulco) and Costa Rica (Port Parker, Culebra, Jasper Island), "always found in *Pocillopora* coral except for 3 young found at Port Parker among algae-covered stones."



*Micropanope (?) maculatus* (Rathbun)

*Lophopanopeus maculatus* Rathbun, 1898, p. 588, pl. 40, figs. 10, 11; 1930, p. 330, text-fig. 51. Garth, 1946, p. 453, pl. 78, figs. 3, 4.

*Micropanope (?) maculatus*, Menzies, 1948, p. 24.

**Range.**—From Magdalena Bay, Lower California, and southern part, Gulf of California, Mexico. Galapagos Islands. 2-70 fathoms. (Garth).

**Material Examined.**—Port Parker, Costa Rica, January 22, 1938, Station 203, D-9, 1.5-4 fathoms, 1 male, 1 female.

**Measurements.**—Male specimen  $4.7 \times 6.5$  mm., female specimen  $4.1 \times 5.7$  mm.

**Habitat.**—Coral bottom.

**Color in Life.**—Not noted.

**Remarks.**—The Port Parker specimens are in good condition and show the distinctive characters well. *Micropanope (?) maculatus* is now recorded from the Central American mainland.

The exclusion of the species from *Lophopanopeus* is the result of Menzies' revision of that genus. Its referral to *Micropanope* in this instance is tentative and without prejudice to systematic studies by the writer now in progress.

*Paraxanthias taylori* (Stimpson)

*Xanthodes taylori* Stimpson, 1860, p. 208, pl. 3, fig. 5.

*Paraxanthias taylori*, Odhner, 1925, p. 85. Rathbun, 1930, p. 466, pl. 188, pl. 189, fig. 1, synonymy.

**Range.**—From Monterey Bay, California, to Magdalena Bay, Lower California, Mexico. Shore to 55 fathoms. (Rathbun, 1930).

**Material Examined.**—SE of Cedros Island, Lower California, Mexico, November 10, 1937, Station 126, D-19, 25 fathoms, 1 male.

**Measurements.**—Male specimen, length 6.8 mm., width 9.8 mm.

**Habitat.**—Rocks, algae. From hole in rocks. (J. Crane, field notes).

**Color in Life.**—Pinkish tan; chelae brown tipped with white. (J. Crane, field notes).

**Remarks.**—A southern California—west coast of Lower California warm-temperate species.

*Menippe obtusa* Stimpson

*Menippe obtusa* Stimpson, 1859, p. 53. Rathbun, 1930, p. 478, pl. 197, pl. 198, figs. 1, 2. Sivertsen, 1933, p. 16. Garth, 1946, p. 470, pl. 82, figs. 3, 4; 1948, p. 45. Crane, 1947, p. 80.

**Range.**—From Corinto, Nicaragua, to La Plata Island, Ecuador. Galapagos Islands. Shore to 6.5 meters. (Garth, 1948).

**Material Examined.**—Passavera Island, Chamela Bay, Mexico, November 19, 1937, 1 female.

**Measurements.**—Female specimen, length 12.8 mm., width 18.3 mm.

**Habitat.**—Not given.

**Color in Life.**—Brown to apricot orange. (J. Crane, of Corinto, Nicaragua, specimens).

**Remarks.**—For a discussion of the interesting habits of this and the related *Menippe frontalis* A. Milne Edwards, including use of the stridulating ridges of the inner surface of the manus, the reader is referred to Crane (1947, p. 80). Chamela Bay, Mexico, represents a northward extension of range from Corinto, Nicaragua, an earlier reported "Zaca" record.

*Pilumnus pygmaeus* Boone

*Pilumnus pygmaeus* Boone, 1927, p. 221, text-fig. 81. Rathbun, 1930, p. 515, pl. 207, figs. 4, 5. Garth, 1946, p. 472, pl. 80, fig. 4; 1948, p. 48. Crane, 1947, p. 81.

**Range.**—From Port Parker, Costa Rica, to Utria Bay, Colombia. Galapagos Islands. Shore to 13 fathoms.

**Material Examined.**—2 specimens from 2 stations:

## Mexico

Port Guatulco, December 4, 1937, in dead pearl oyster, 1 female.

## Costa Rica

Port Parker, [date?], 1 male.

**Measurements.**—Male specimen  $2.5 \times 3.3$  mm., female specimen  $2.7 \times 3.6$  mm.

**Habitat.**—From weed in tidepools and on undersides of overgrown rocks close to low tide. (Crane, 1947, of Costa Rican specimens).

**Breeding.**—Eggs in January. (Crane, 1947).

**Remarks.**—The known range of the species is extended northward from Port Parker, Costa Rica, to Port Guatulco, Mexico.

*Pilumnus limosus* Smith

*Pilumnus limosus* Smith, 1869, p. 285. Rathbun, 1930, p. 518, pl. 208, pl. 209, figs. 1-3.

**Range.**—From Panama to Paita, Peru. Shore. (Rathbun, 1930).

**Material Examined.**—2 specimens from 2 stations:

## Mexico

4 mi. SSW of Maldonado Point, November 30, 1937, Station 192, D-1, 26 fathoms, 1 female.

Tangola-Tangola Bay, December 13, 1937, Station 196, D-18, 30 fathoms, 1 male.

**Measurements.**—Male specimen  $5.0 \times 6.8$  mm., female specimen  $7.4 \times 9.9$  mm.

**Habitat.**—Mud.



*Color in Life.* — Brownish. (J. Crane, field notes).

*Remarks.*—A distinctive species, with a characteristic pattern of pubescence that obscures the scattered granules of the carapace. *Pilumnus limosus* is now recorded from Mexico, a northward extension from Panama, and to a depth of 30 fathoms.

*Pilumnus stimpsonii* Miers

*Pilumnus marginatus* Stimpson, 1871, p. 109. Not *P. marginatus* Stimpson, 1858.

*Pilumnus stimpsonii* Miers, 1886, p. 147 (name substituted for *P. marginatus*, preoccupied). Rathbun, 1930, p. 524, pl. 205, figs. 5, 6.

*Range.*—Cape San Lucas, Lower California, and Manzanillo, Colima, Mexico. (Rathbun, 1930).

*Material Examined.*—Port Parker, Costa Rica, January 22, 1938, Station 203, D-10, 2.5-6 fathoms, 1 male, 6 females (3 ovigerous).

*Measurements.*—Male  $2.9 \times 3.4$  mm., females from  $3.2 \times 4.0$  to  $4.0 \times 4.9$  mm., ovigerous females from  $3.2 \times 4.0$  to  $3.8 \times 4.5$  mm.

*Habitat.*—Rocks.

*Color in Life.*—Not recorded.

*Breeding.*—Costa Rica in late January. Mexico in mid-July. (Rathbun, 1930).

*Remarks.*—Since Stimpson's type is non-extant and the material reported by Rathbun (1930) consists in its entirety of 3 specimens collected by Orcutt in Mexico, the "Zaca" series from Port Parker represents more than double the number of specimens existing in collections and reported upon to date. Orcutt's material also included an ovigerous female. The range of *Pilumnus stimpsonii* is extended southward to Costa Rica, the depth to 6 fathoms.

*Heteractaea peterseni* Garth

*Heteractaea peterseni* Garth, 1940, p. 81, pl. 22, figs. 1-5.

*Range.*—From San Francisco Island, Gulf of California, Mexico, to Octavia Bay, Colombia. 35-44 fathoms. (Garth).

*Material Examined.*—Hannibal Bank, Panama, March 20, 1938, Station 224, D-1 to D-3, 40-35 fathoms, 1 female, 2 young.

*Measurements.*—Female specimen  $5.5 \times 8.0$  mm., young  $3.9 \times 5.7$  and  $4.4 \times 6.3$  mm.

*Habitat.*—Rocks, dead coral, mud; sand, shells, algae. The fact that the holotype, from Octavia Bay, Colombia, was cracked from rock makes the former habitat the more likely. The channeled meri of the walking legs are believed to represent an adaptation for breathing from a rock-bound enclosure. Unfortunately, materials

from two dissimilar bottom types at Station 224 were combined.

*Color in Life.*—See Garth (1940, p. 83).

*Remarks.*—The findings by the "Zaca" of *Heteractaea peterseni* off Panama bridges the gap between the two "Velero III" stations in Colombia and the Gulf of California. The uniformity of depth for the three stations is perhaps more than coincidental: Octavia Bay, Colombia, 35-40 fathoms; San Francisco Island, Gulf of California, 43-44 fathoms; and Hannibal Bank, Panama, 35-40 fathoms.

*Quadrella nitida* Smith

(Text-fig. 2)

*Quadrella nitida* Smith, 1869, p. 288. Rathbun, 1930, p. 561, pl. 229, synonymy. Crane, 1937, p. 74. Garth, 1946, p. 494, pl. 80, fig. 6.

*Range.*—From off Cape San Lucas, Lower California, and Arena Bank, Gulf of California, Mexico, to Pacheca Island, Panama. Galapagos Islands. 6-75 fathoms.

*Material Examined.* — 15 specimens from a single station: Mazanillo, Mexico, November 22, 1937, Station 184, D-1, 25 fathoms, 1 male, 3 females, 2 young, 1 megalops; D-2, 30 fathoms, 3 males, 3 females, 2 young.

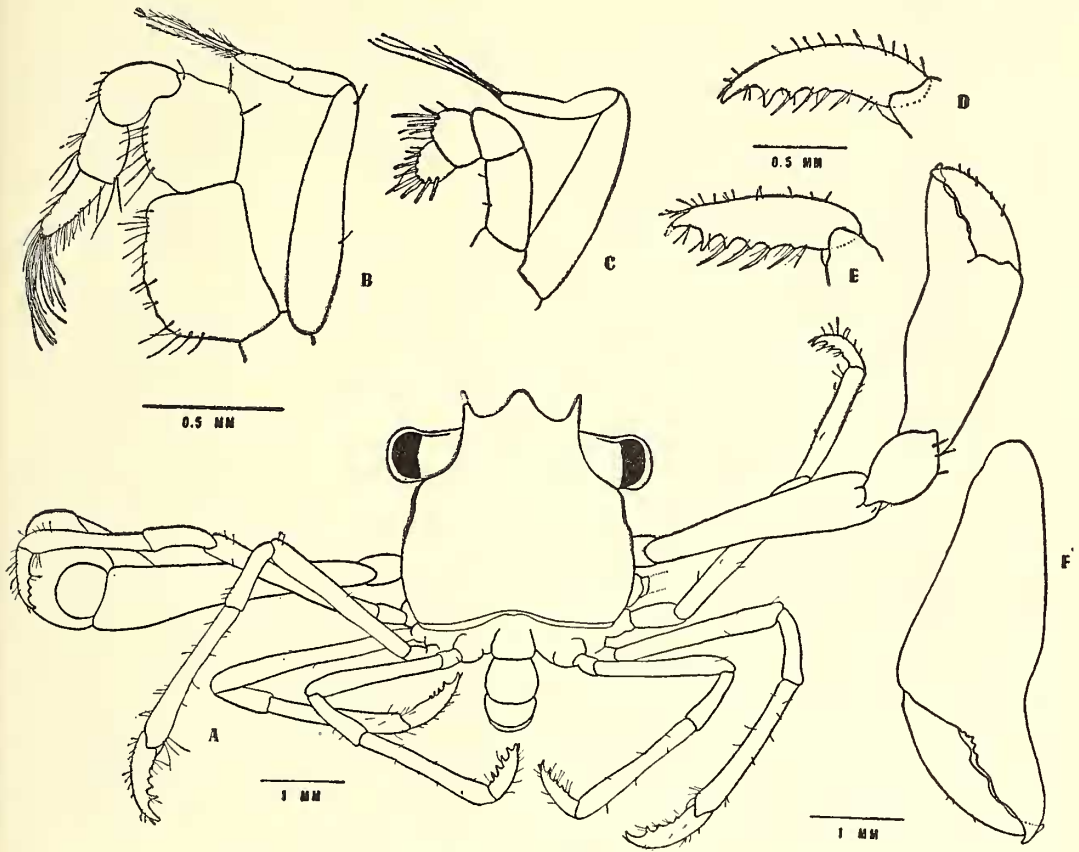
*Measurements.*—Males from  $5.0 \times 5.5$  to  $6.9 \times 8.0$  mm., females from  $4.9 \times 5.4$  to  $7.5 \times 8.6$  mm., young from  $3.3 \times 3.4$  mm.

*Habitat.*—Gravelly sand.

*Color in Life.*—Two middle-sized specimens not pure white or with bold orange chelipeds like a northern form [cf. Crane, 1937, p. 74]. Two larger specimens all carapace mouse gray with posterolateral margins curdled white. Chelipeds light brown with a band of dark gray polka-dotted with white at distal end of each segment. Rest of segment dotted with fine darker brown. Ambulatories banded gray and white. Smaller specimen white with chestnut front and chestnut chelipeds. Largest specimen curdled white; chelipeds translucent violet gray or pale rosy. Definitely matching lavender shade of some of the gorgonids. (J. Crane, field notes).

*Remarks.*—Although the only reference to the presence of gorgonian corals at this station is to be found in the color description above, it is a safe presumption that the specimens were taken on *Muricea miser* Verrill or a related species. The symbiotic relationship between these crabs and the corals is discussed by Crane (1937). The megalops of the species has not previously been described.

*Description of the Megalops.* — Carapace smooth and bare, slightly broader than long, sides convex, hepatic margins also slightly con-



TEXT-FIG. 2. *Quadrella nitida* Smith, megalops. A, dorsal view; B, third maxilliped; C, second maxilliped; D, left third walking leg; E, left fourth walking leg; F, left chela. J. W. Knudsen, del. (B and C, same scale; D and E, same scale).

vex, posterior margin concave. Front wide, rostrum deflexed, bluntly triangular, straight-sided, broadly separated from lateral frontal spines; these spines pointing upward and not extending as far forward as rostrum. Transorbital breadth greater than breadth of carapace.

Second maxilliped with a two-segmented exopodite bearing 5 terminal setae; endopodite with four segments bearing 2, 0, 8, and 10 or more setae from merus to dactylus. Third maxilliped with a two-segmented exopodite bearing 5 or 6 plumose setae terminally; endopodite with ischium and merus broadened; ischium subrectangular, with 16 or more setae on inner margin; merus subquadrate, with 8 or more setae on inner margin and 2 at anteroexternal angle; carpus rounded distally, a few setae on outer margin; propodus with 6 or more setae arranged in tufts, one on inner, 2 on outer margin; dactylus with 12 or more setae on inner, 4 on outer margin, with a terminal brush of a dozen or more longer hairs.

Cheliped without an ischial spine; merus elongate, cylindrical, broadening distally; carpus ovate, three setae on outer distal margin; manus elongate, compressed, broadening distally, lower margin sinuous; dactylus with a row of 5 setae, closing against propodus without a gape, their tips crossing.

Walking legs slender, cylindrical; meri long and of a length equal to their respective propodi; carpi only half as long as meri and of a length equal to their dactyli; legs finely and sparingly setose. Dactyli adapted to clinging to gorgoniaceous corals, having a curved nail and superior bristle terminally, followed by a succession of teeth diminishing regularly in size from tip to base along lower margin, accompanied by stout bristles.

Abdomen with six segments and a telson; sixth segment and telson smaller than preceding segments; telson arcuate.

## Family GONEPLACIDAE

*Pseudorhombila xanthiformis* Garth

*Pseudorhombila xanthiformis* Garth, 1940, p. 86, pl. 24, figs. 1-5.

*Range*.—Known only from the type locality, Gorgona Island, Colombia. 40-60 fathoms.

*Material Examined*.—14 mi. S × E of Judas Point, Costa Rica, March 1, 1938, Station 214, D-1, D-3, 42-50 fathoms, 3 males, 1 female. Off Ballenas Bay, Gulf of Nicoya, Costa Rica, February 25, 1938, Station 213, D-12, 35 fathoms, right and left chelae, of large size; D-16, 45 fathoms, carapace fragment.

*Measurements*.—Males  $12.6 \times 17.3$  and  $15.6 \times 22.9$  mm., female  $8.9 \times 12.7$  mm., young male  $6.4 \times 8.9$  mm.

*Habitat*.—Mud and shell.

*Color in Life*.—Not recorded.

*Remarks*.—Known only from the type female, a  $15 \times 22$  mm. specimen, *Pseudorhombila xanthiformis* is now represented by males of good size, and from a locality midway between the type locality, Gorgona Island, Colombia, and the type locality of *Oedioplax granulata* Rathbun. When males of the latter species become available, it should be possible to elucidate the relationship between the two species, and to tell whether they should belong in the same or in different genera. (See discussion, Garth, 1940, p. 88).

*Description of the Male Abdomen*.—Segments 3-5 fused, suture lines clearly visible. Abdomen widest at base of segment 3, narrowest at middle of segment 6, sides of segments 4-6 concave. Segment 7 broader than long, sides straight and convergent, tip rounded.

*Euryplax polita* Smith

*Euryplax politus* Smith, 1870, p. 163.

*Euryplax polita*, Rathbun, 1918, p. 36.

*Range*.—Apart from a listing by Glassell (1934) as occurring in the Gulf of California, but without specific locality, the species is known only from Panama.

*Material Examined*.—Tangola-Tangola Bay, Mexico, Station 196, December 9, 1937, D-6, D-8, 9-7 fathoms, 2 females, 2 young; December 12, 1937, D-13, 10 fathoms, 1 male, 1 young; December 13, 1937, D-16, 16 fathoms, 1 young female; D-17, 23 fathoms, 1 female.

*Measurements*.—Male  $8.7 \times 14.8$  mm., females from  $4.4 \times 5.9$  to  $5.8 \times 8.8$  mm., young from  $3.2 \times 4.4$  mm.

*Habitat*.—Sand, gravelly sand, crushed shell, and mud.

*Color in Life*.—Not noted.

*Remarks*.—The male above is larger than the male holotype, a  $6.9 \times 11.2$  mm. specimen. *Euryplax polita* is now known from a definite west Mexican locality. Included with the adult specimens enumerated above are a total of 11 megalopa possibly referable to this species.

*Chasmophora macrophthalma* (Rathbun)

*Eucratopsis macrophthalma* Rathbun, 1898, p. 601, pl. 43, figs. 3, 4.

*Chasmophora macrophthalma*, Rathbun, 1914, p. 119, text-fig. 2; 1918, p. 37, text-fig. 12.

*Range*.—Known only from the type locality, Bay of Panama. 51.5 fathoms. (Rathbun, 1898).

*Material Examined*.—32 specimens from 3 stations:

## Mexico

4 mi. SSW of Maldonado Point, November 30, 1937, Station 192, D-1, 26 fathoms, 4 males, 4 females (3 ovigerous).

Santa Cruz Bay, December 7, 1937, Station 195, D-21, 18 fathoms, 2 females.

Tangola-Tangola Bay, December 13, 1937, Station 196, D-17, 23 fathoms, 12 males, 10 females (1 ovigerous).

*Measurements*.—Males from  $2.1 \times 3.1$  to  $4.5 \times 8.8$  mm., females from  $2.7 \times 4.6$  to  $4.4 \times 8.3$  mm., ovigerous females from  $3.2 \times 5.9$  to  $4.4 \times 8.3$  mm.

*Habitat*.—Mud.

*Color in Life*.—Not noted.

*Remarks*.—The larger males have the chelipeds tremendously developed for their rather small size. The smaller females ( $3.0 \times 5.1$  and  $3.0 \times 5.3$ ) show spinulous anterolateral teeth. *Chasmophora macrophthalma* may now be reported from west Mexico, a northward range extension from Panama.

*Speocarcinus granulimanus* Rathbun

*Speocarcinus granulimanus* Rathbun, 1893, p. 242; 1918, p. 40, text-fig. 15, pl. 9.

*Range*.—Off Cedros Island, Lower California, and from off Consag Rock to off Point Fermin, Gulf of California, Mexico. 23-33 fathoms. (Rathbun, 1893).

*Material Examined*.—6 specimens from 4 stations:

## El Salvador

La Libertad, December 16, 1937, Station 198, D-1 or D-2, 13-14 fathoms, 1 female.

Meanguera Island, Gulf of Fonseca, Station 199, December 23, 1937, D-1, 16 fathoms, 2 young; December 27, 1937, D-11, D-12, 5 fathoms, 1 male.



## Costa Rica

Cedro Island, Gulf of Nicoya, February 13, 1938, Station 213, D-1 to D-10, 4-10 fathoms, 1 young male.

Golfito, Gulf of Dulce, March 9, 1938, Station 218, D-8, 6 fathoms, 1 female.

*Measurements.* — Male  $11.3 \times 14.3$  mm., females from  $6.0 \times 7.9$  to  $7.3 \times 9.6$  mm., young male  $3.6 \times 4.3$ , young female  $4.6 \times 6.0$  mm.

*Habitat.*—Mud; sand, mud, and crushed shell; mangrove leaves, mud, and shells.

*Color in Life.*—Not noted.

*Remarks.*—As characteristic of mud bottoms as the following *Speocarcinus californiensis*, and occurring in the same dredge haul with it at Golfito, *S. granulimanus* may now be recorded from El Salvador and Costa Rica, a southward range extension from the Gulf of California.

***Speocarcinus californiensis* (Lockington)**

*Eucrate? californiensis* Lockington, 1877a, p. 33.

*Speocarcinus californiensis*, Rathbun, 1904a, p. 190, pl. 9, fig. 1; 1918, p. 42, text-fig. 16, pl. 10, figs. 2, 3. Schmitt, 1921, p. 249, text-fig. 148.

*Range.*—San Pedro to San Diego, California. (Rathbun, 1918). Also Gulf of California, without specific locality. (Glassell, 1934).

*Material Examined.* — 12 specimens from 3 stations:

## Costa Rica

Port Parker, January 20, 1938, Station 203, D-1 to D-3, 10-15 fathoms, 1 male.

Port Culebra, January 30, 1938, Station 206, D-2, D-3, 14 fathoms, 1 male, 4 females (1 ovigerous).

Golfito, Gulf of Dulce, March 9, 1938, Station 218, D-8, 6 fathoms, 4 males, 1 female, 1 young.

*Measurements.*—Males from  $3.9 \times 5.1$  to  $5.8 \times 7.6$  mm., females from  $4.1 \times 5.3$  to  $5.6 \times 7.2$  mm., the latter ovigerous, young from  $2.3 \times 2.8$  mm.

*Habitat.* — Sandy mud, crushed shell; mangrove leaves, mud, and shell.

*Color in Life.*—Not noted.

*Breeding.*—Costa Rica in late January.

*Remarks.*—Like the preceding *Speocarcinus granulimanus*, *S. californiensis* may now be recorded from Costa Rica, although not from El Salvador, a range extension southward from the Gulf of California, locality uncertain.

***Speocarcinus ostreaticola* Rathbun**

*Speocarcinus ostreaticola* Rathbun, 1910, p. 545, pl. 48, fig. 2; 1918, p. 41, pl. 10, fig. 1.

*Range.*—Known only from the type locality, Matapalo (near Capon), Peru, where it occurs in oyster beds. (Rathbun, 1910).

*Material Examined.*—95 specimens from four localities:

## Nicaragua

Monypenny Point, Gulf of Fonseca, December 24, 1937, Station 199, D-2, D-6, 4-5 fathoms, 2 males.

## El Salvador

La Unión, Gulf of Fonseca, December 27, 1937, Station 199, D-14, 5 fathoms, 1 male, 1 female.

## Panama

Bahia Honda, March 16, 1938, no station number, depth not given, 14 males.

Bella Vista, Panama City, date not given, 75 males, 4 females.

*Measurements.*—Males from  $7.3 \times 10.0$  to  $16.0 \times 24.6$  mm., females from  $6.8 \times 9.3$  to  $9.2 \times 13.0$  mm.

*Habitat.*—Mud.

*Color in Life.*—Not noted.

*Remarks.*—In view of the exceeding abundance of this species, both at Bahia Honda and Bella Vista, Panama (where males predominated over females, however), it is difficult to see how it has remained a rarity in collections. Known only from Peru, and from the unique type specimen, at least insofar as recorded in the literature, *Speocarcinus ostreaticola* may now be said to occur off Central America as far north as Nicaragua. Specimens show great difference as to the amount of pubescence on the carapace, some being entirely bare, others almost "furry." The interspace between the first and second anterolateral teeth is more U-shaped than V-shaped.

***Chasmocarcinus latipes* Rathbun**

*Chasmocarcinus latipes* Rathbun, 1898, p. 602, pl. 43, fig. 5; 1918, p. 57, text-figs. 25, 26. Crane, 1937, p. 75. Garth, 1948, p. 52.

*Chasmocarcinus ferrugineus* Glassell, 1936, p. 216. Crane, 1937, p. 75, pl. 7, fig. 24.

*Range.*—From Cedros Island, Lower California, and Arena Bank, Gulf of California, Mexico, to off Esmeraldas, Ecuador. 20-51 fathoms. (Garth, 1948).

*Material Examined.*—22 specimens from 5 stations:

## El Salvador

La Libertad, December 16, 1937, Station 198, D-1 or D-2, 13-14 fathoms, 1 male, 1 female.

Meanguera Island, Gulf of Fonseca, December 23, 1937, Station 199, D-1, 16 fathoms, 3 males, 5 females.

## Costa Rica

Off Ballenas Bay, February 25, 1938, Station 213, D-12, D-16, 35-45 fathoms, 1 male, 1 female.

14 mi. S × E of Judas Point, March 1, 1938, Station 214, D-2, D-3, 43-50 fathoms, 5 males, 4 females.

## Panama

Gulf of Chiriqui, March 13, 1938, Station 221, D-4, 38 fathoms, 1 female.

*Measurements*.—Males from  $4.0 \times 5.6$  to  $9.1 \times 12.2$  mm., females from  $4.2 \times 5.8$  to  $8.6 \times 12.0$  mm. A larger female, crushed, could not be measured.

*Habitat*.—Mud, sand, mud and crushed shell; sandy mud.

*Color in Life*.—Carapace and chelipeds grayish-white; center of carapace pink; basal segments of all specimens brown. Pubescence brown. (Crane, 1937, of Gulf of California specimens).

*Remarks*.—Specimens of the reddish-brown color associated with *Chasmocarcinus ferrugineus* Glassell occur with normally colored individuals at Judas Point, thus supporting the synonymy given above. The ruddy color is due to a reddish mud. It is noteworthy that all *Chasmocarcinus* collected by the "Zaca" were *C. latipes*, and that none were *C. longipes* Garth (1940), which has as its range the Panama Bight, from Secas Islands, Panama, to La Plata Island, Ecuador. The equal and similar chelae of the large male from Judas Point serve to distinguish *C. latipes* from *C. longipes*, the chelae of which are unequal and dissimilar.

*Hexapus williamsi* Glassell

*Hexapus williamsi* Glassell, 1938, p. 445, pl. 35, figs. 1-4.

*Range*.—Known only from the type locality, San José, Guatemala.

*Material Examined*.—7 mi. W of Champerico, Guatemala, December 15, 1937, Station 197, D-2, 14 fathoms, 1 ovigerous female.

*Measurements*.—Female specimen, length 9.7 mm., width 15.5 mm.

*Habitat*.—Mud.

*Color in Life*.—Not noted.

*Breeding*.—Guatemala in mid-December.

*Remarks*.—Named for M. Woodbridge Williams and described under the title "New and obscure Decapod Crustacea from the west American coasts," the species has not been taken again since its discovery in April, 1937, by the "Stranger" of Capt. Fred E. Lewis. The "Zaca" specimen is therefore the first since the type,

and the only female, the holotype being a male. A slight extension of range can be reported, since Champerico is about 75 miles north and west of San José, Guatemala.

## Family CYMOPOLIIDAE

*Cymopolia lucasii* (Rathbun)

*Palicus lucasii* Rathbun, 1898, p. 600, pl. 43, fig. 2.

*Cymopolia lucasii*, Rathbun, 1918, p. 193, text-fig. 119, pl. 44, figs. 1, 2; Crane, 1937, p. 76. Garth, 1946, p. 500, pl. 87, fig. 1.

*Range*.—From Arena Bank, Gulf of California, to Cape San Lucas, Lower California, Mexico. Galapagos Islands. 5-60 fathoms. (Garth, 1946).

*Material Examined*.—2 specimens from 1 station:

## Mexico

Sulphur Bay, Clarion Island, May 11, 1936, Station 163, D-1, 20 fathoms, 1 male, crushed.

3 mi. off Pyramid Rock, Clarion Island, May 12, 1936, Station 163, D-2, 55 fathoms, 1 male.

*Measurements*.—Males  $5.2 \times 6.0$  and  $11.9 \times 13.4$  mm.

*Habitat*.—At Arena and Gorda Banks on muddy and sandy bottoms. (Crane, 1937).

*Remarks*.—*Cymopolia lucasii* is now recorded from Clarion Island, an intermediate locality between Cape San Lucas and the Galapagos Islands.

## LITERATURE CITED

BEEBE, W.

1942. Book of Bays. Pp. (xviii) 302. Harcourt, Brace and Co., New York.

BENEDICT, J. E., & MARY J. RATHBUN

1891. The genus *Panopeus*. Proc. U. S. Nat. Mus., vol. 14, pp. 355-385, pls. 19-24.

BOONE, LEE

1927. The littoral crustacean fauna of the Galapagos Islands. Part I: Brachyura. Zoologica, vol. 8, no. 4, pp. 127-288, text-figs. 34-102.

1930. Scientific results of the cruises of the yachts "Eagle" and "Ara," 1921-1928, William K. Vanderbilt, commanding. Crustacea: Stomatopoda and Brachyura. Bull. Vanderbilt Mar. Mus., vol. 2, pp. 1-228, pls. 1-74.

BOTT, R.

1955. Dekapoden (Crustacea) aus El Salvador. 2. Litorale Dekapoden, ausser *Uca*. Senckenbergiana, Biologica, vol. 36, pp. 45-70, pls. 3-8, text-figs. 1-7.

## BUITENDIJK, ALIDA M.

1950. Note on a collection of Decapoda Brachyura from the coasts of Mexico, including the description of a new genus and species. *Zool. Mededel. Rijksmus. Natuur. Hist. Leiden*, vol. 30, no. 17, pp. 269-282, pl. 10, text-fig. 1.

## COVENTRY, G. A.

1944. Results of the Fifth George Vanderbilt Expedition (1941). (Bahamas, Caribbean Sea, Panama, Galapagos Archipelago and Mexican Pacific Islands). *The Crustacea. Monog. 6, Acad. Nat. Sci. Philadelphia*, pp. 531-544.

## CRANE, JOCELYN

1937. The Templeton Crocker Expedition. III. Brachygnathous crabs from the Gulf of California and the west coast of Lower California. *Zoologica*, vol. 22, pp. 47-78, pls. 1-8.
1947. Intertidal brachygnathous crabs from the west coast of tropical America with special reference to ecology. *Zoologica*, vol. 32, pp. 69-95, text-figs. 1-3.

## FAXON, W.

1893. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California . . . by the U. S. Fish Commission steamer "Albatross," during 1891 . . . VI. Preliminary descriptions of new species of Crustacea. *Bull. Mus. Compar. Zool. Harvard*, vol. 24, pp. 149-220.
1895. Reports on an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands . . . by the U. S. Fish Commission steamer "Albatross," during 1891 . . . XV. The stalk-eyed Crustacea. *Mem. Mus. Compar. Zool. Harvard*, vol. 18, pp. 1-292, pls. A-K, 1-56.

## FINNEGAN, SUSAN

1931. Report on the Brachyura collected in Central America, the Gorgona and Galapagos Islands, by Dr. Crossland on the "St. George" Expedition to the Pacific, 1924-25. *Jour. Linn. Soc. London, Zool.*, vol. 37, pp. 607-673, text-figs. 1-6.

## GARTH, J. S.

1940. Some new species of brachyuran crabs from Mexico and the Central and South American mainland. *Allan Hancock Pacific Exped.*, vol. 5, no. 3, pp. 53-127, pls. 11-26.
1946. Littoral brachyuran fauna of the Galapagos Archipelago. *Allan Hancock Pacific Exped.*, vol. 5, no. 10, pp. (iv) 341-601, pls. 49-87, text-fig. 1.

1948. The Brachyura of the "Askoy" Expedition with remarks on carcinological collecting in the Panama Bight. *Bull. Amer. Mus. Nat. Hist.*, vol. 92, art. 1, pp. 1-66, pls. 1-8, text-figs. 1-5.

1957. Reports of the Lund University Chile Expedition 1948-1949. No. 29. The Crustacea Decapoda Brachyura of Chile. *Lunds Univ. Årsskr.*, n.s., Avd. 2, vol. 53, no. 7, pp. 1-127, pls. 1-4, text-figs. 1-11.
1958. Brachyura of the Pacific coast of America. *Oxyrhyncha*. *Allan Hancock Pacific Exped.*, vol. 21, pp. (vi) 859, pls. A-Z, Z<sub>1</sub>-Z<sub>4</sub>, 1-55, text-figs. 1-10. In 2 parts.
1959. Eastern Pacific Expeditions of the New York Zoological Society. XLIV. Non-intertidal brachygnathous crabs from the west coast of tropical America. Part 1: *Brachygnatha Oxyrhyncha*. *Zoologica*, vol. 44, pt. 3, pp. 105-126, pl. 1, text-figs. 1, 2.

## GERSTAECKER, C. E. A.

1857. Carcinologische Beiträge. *Arch. f. Naturgesch.*, vol. 22, pt. 1, pp. 101-162, pls. 4-6.

## GLASSELL, S. A.

1934. Some corrections needed in recent carcinological literature. *Trans. San Diego Soc. Nat. Hist.*, vol. 7, pp. 453-454.
1935. New or little known crabs from the Pacific coast of northern Mexico. *Trans. San Diego Soc. Nat. Hist.*, vol. 8, pp. 91-106, pls. 9-16.
1936. The Templeton Crocker Expedition. I. Six new brachyuran crabs from the Gulf of California. *Zoologica*, vol. 21, pp. 213-218.
1938. New and obscure decapod Crustacea from the west American coasts. *Trans. San Diego Soc. Nat. Hist.*, vol. 8, pp. 411-453, pls. 27-36.

## HOLTHUIS, L. B.

1954. On a collection of decapod Crustacea from the republic of El Salvador (Central America). *Zool. Verhand. Rijksmus. Natuur. Hist. Leiden*, no. 23, pp. 1-43, pls. 1-2, text-figs. 1-15.

## LAMARCK, J. B. P. A. DE M. DE

1818. *Histoire naturelle des animaux sans vertèbres*. 1st ed., vol. 5, pp. 612. Paris.

## LOCKINGTON, W. N.

- 1877a. Remarks on the Crustacea of the Pacific coast, with descriptions of some new species. *Proc. Calif. Acad. Sci.*, vol. 7, pp. 28-36.
- 1877b. Remarks on the Crustacea of the west coast of North America, with a catalogue of the species in the museum of the California Academy of Sciences. *Proc. Calif. Acad. Sci.*, vol. 7, pp. 94-108.



## MENZIES, R. J.

1948. A revision of the brachyuran genus *Lophopanopeus*. Allan Hancock Found. Pubs., Occas. Paper No. 4, pp. 1-45, pls. 1-6.

## MIERS, E. J.

1886. Report on the Brachyura collected by H. M. S. Challenger during the years 1873-1876. Rpt. Zool. Challenger Exped., vol. 17, pp. (1) 362, pls. 1-29. London, Edinburgh & Dublin.

## MILNE EDWARDS, A.

1861. Études zoologiques sur les crustacés récents de la famille des portuniens. Arch. Mus. Hist. Nat. Paris, vol. 10, pp. 309-428, pls. 28-38.
1874. [No title.] In Fisher, P., L. de Folin, and L. Périer, Les fonds de la mer. Paris, vol. 2.
- 1873-1880. Études sur les xiphosures et les crustacés de la région mexicaine. Mission Scientifique au Mexique et dans l'Amérique centrale, pt. 5, pp. 368, pls. 1-61. Paris.

## ODHNER, T.

1925. Monographierte Gattungen der Krabbenfamilie Xanthidae. Göteborg's K. Vet. Handl., Fjärde Följden, vol. 29, no. 1, pp. 1-92, pls. 1-5, text-figs. 1-7.

## ORDWAY, A.

1863. Monograph of the genus *Callinectes*. Boston Jour. Nat. Hist., vol. 7, no. 4, pp. 567-583.

## RATHBUN, MARY J.

1893. Scientific results of explorations by the U. S. Fish Commission steamer Albatross. XXIV. Descriptions of new genera and species of crabs from the west coast of North America and the Sandwich Islands. Proc. U. S. Natl. Mus., vol. 16, pp. 223-260.
1898. The Brachyura collected by the U. S. Fish Commission steamer Albatross on the voyage from Norfolk, Virginia, to San Francisco, California, 1887-1888. Proc. U. S. Natl. Mus., vol. 21, pp. 567-616, pls. 41-44.
1902. Papers from the Hopkins-Stanford Expedition, 1898-1899. VIII. Brachyura and Macrura. Proc. Washington Acad. Sci., vol. 4, pp. 275-292, pl. 12.
- 1904a. Decapod crustaceans of the northwest coast of North America. Harriman Alaska Expedition, vol. 10, Crustaceans, pp. 210, pls. 1-10, text-figs. 1-95. Washington.
- 1904b. Descriptions of three new species of American crabs. Proc. Biol. Soc. Washington, vol. 17, pp. 161-162.
1906. Descriptions of three new mangrove crabs from Costa Rica. Proc. Biol. Soc. Washington, vol. 19, pp. 99-100.
1910. The stalk-eyed Crustacea of Peru and the adjacent coast. Proc. U. S. Natl. Mus., vol. 38, pp. 531-620, pls. 36-56.

1914. New genera and species of American brachyrhynchous crabs. Proc. U. S. Natl. Mus., vol. 47, pp. 117-129, pls. 1-10.
1918. The grapsoid crabs of America. Bull. U. S. Natl. Mus., no. 97, pp. 1-461, pls. 1-161, text-figs. 1-172.
1923. Scientific results of the expedition to the Gulf of California . . . by the U. S. Fisheries steamship "Albatross," in 1911 . . . XIII. The brachyuran crabs collected by the U. S. Fisheries steamer "Albatross" in 1911, chiefly on the west coast of Mexico. Bull. Amer. Mus. Nat. Hist., vol. 48, pp. 619-637, pls. 26-36, text-figs. 1-7.
1930. The cancroid crabs of America of the families Euryalidae, Portunidae, Atelecyclidae, Cancridae, and Xanthidae. Bull. U. S. Natl. Mus., no. 152, pp. 1-609, pls. 1-230, text-figs. 1-85.
1935. Preliminary descriptions of six new species of crabs from the Pacific coast of America. Proc. Biol. Soc. Washington, vol. 48, pp. 49-52.

## SCHMITT, W. L.

1921. The marine decapod Crustacea of California. Univ. California Pubs. Zool., vol. 23, pp. 470, pls. 1-50, text-figs. 1-164.

## SIVERTSEN, E.

1933. The Norwegian Zoological Expedition to the Galapagos Islands 1925, conducted by Alf Wollebaek. VII. Littoral Crustacea Decapoda from the Galapagos Islands. Oslo Zool. Meddel. no. 38, pp. 1-23, pls. 1-4.

## SMITH, S. I.

1869. Notes on new or little-known species of American cancroid Crustacea. Proc. Boston Soc. Nat. Hist., vol. 12, pp. 274-289.
1870. Notes on American Crustacea. No. 1. Ocyropoidea. Trans. Connecticut Acad. Arts Sci., vol. 2, pp. 113-176.

## STIMPSON, W.

1858. Prodromus descriptionis animalium evertebratorum quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rodgers ducibus, observavit et descripsit. Pars. IV. Crustacea Cancroidea et Crystoidea. Proc. Acad. Nat. Sci. Philadelphia, vol. 10, pp. 31-40.
1859. Notes on North American Crustacea, No. 1. Ann. Lyceum Nat. Hist. New York, vol. 7, pp. 49-93, pl. 1.
1860. Notes on North American Crustacea, in the Museum of the Smithsonian Institution. No. II. Ann. Lyceum Nat. Hist. New York, vol. 7, pp. 176-246, pls. 2, 5.
1871. Notes on North American Crustacea, in the Museum of the Smithsonian Institution. No. III. Ann. Lyceum Nat. Hist. New York, vol. 10, pp. 92-136.

## EXPLANATION OF THE PLATE

## PLATE I

*Hexapanopeus beebei*, new species

- FIG. 1. Male holotype, dorsal view.  
FIG. 2. Male holotype, ventral view.  
FIG. 3. Female paratype, dorsal view.  
FIG. 4. Female paratype, ventral view. (Right third walking leg of female paratype missing)